

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SMAXTEC INC. and
SMAXTEC ANIMAL CARE GMBH,
Petitioners

v.

ST REPRODUCTIVE TECHNOLOGIES, LLC,
Patent Owner

Case IPR2024-00885
Patent No. 8,823,515

**DECLARATION OF TIMOTHY J. BOWSER, PH.D. IN SUPPORT OF
PATENT OWNER RESPONSE**

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I. INTRODUCTION

1. My name is Dr. Timothy J. Bowser. I have been retained by ST Reproductive Technologies, LLC (the “Patent Owner” or “ST Repro”) as an independent expert consultant in this proceeding before the United States Patent and Trademark Office. I am the same Tim Bowser that submitted a declaration in this case, which has been filed as Exhibit 2001. I have served as an expert in *inter partes* review (“IPR”) proceedings in IPR Case No. 2016-01435, *Henny Penny Corp. v. Frymaster LLC*, United States Patent & Trademark Office before the Patent Trial and Appeal Board.

2. As a sub-contractor to United Expert Holdings, LLC d/b/a Round Table Group (“RTG”), I was retained in this matter by ST Repro to provide analysis, opinions, and observations regarding animal management and tracking, including in relation to U.S. Patent No. 8,823,515 (the “’515 Patent”) and IPR2024-00885. RTG is being compensated at the rate of \$405 per hour for my work, of which I receive \$250 per hour, which is my standard consulting rate. RTG is also being compensated at the rate of \$375 per hour for my travel time (five hour minimum), of which I receive \$250 per hour. My fee is not contingent on the outcome of this matter or on any of the positions I have taken, as discussed below. Although I am being compensated at my standard consulting rate for the time I spend on this matter, I have no personal financial interest in any of the entities involved in this proceeding,

and my compensation does not depend in any way on my testimony, my conclusions, or the outcome of this proceeding.

3. For this declaration, I have been asked to review and respond to statements made in the Petition filed in IPR2024-00885 and to the opinions provided in the Declaration of Tami M. Brown-Brandl, Ph.D. (Ex. 1003) filed in connection with the Petition. I understand Dr. Brown-Brandl is the expert witness engaged on behalf of Petitioners. I have also been asked to consider and provide my opinions regarding the references Petitioners assert against the '515 Patent, and to compare those references to the claims of the '515 Patent that have been challenged in the Petition. I have also been asked to consider and provide opinions regarding the public accessibility of one of Petitioner's references, Ex. 1005 ("Trevarthen"). My opinions and the basis for those opinions are outlined below. The testimony I may provide about scientific principles relating to my analysis and opinions includes subjects relating to, for example, herd management, animal monitoring, and the use of radiofrequency devices in such activities.

4. I reserve the right to revise or supplement my opinions if additional information makes either appropriate, or if Petitioners or Dr. Brown-Brandl revise or supplement their allegations or opinions.

5. A list of the documents and material I have considered in developing my opinion can be found in the Appendix below.

II. QUALIFICATIONS AND BACKGROUND

6. Attached as Exhibit 2002 is my curriculum vitae, incorporated by reference within this declaration. The following is a brief summary of my qualifications.

7. I received a Bachelor of Science (B.S.) degree in Agricultural Engineering from The Pennsylvania State University in May 1984. I then received a Master of Science (M.S.) degree in Agricultural Engineering from The Pennsylvania State University in December 1986. I further received a Doctorate (Ph.D.) in Agricultural Engineering from The University of Tennessee in May 1994, with my thesis titled “Thin film drying on a permeable surface.” I am also a Professional Engineer in the State of Oklahoma (registration number 19992) and the State of Texas (registration number 145885).

8. In October, 1986, I joined the Gerber Products Company as an Assistant Process Engineer in their R&D department in Fremont Michigan. Later in 1988, I moved to their flagship plant in Fort Smith, Arkansas as a Process Engineer. The Gerber Products Company was at the forefront of the industry in product quality and safety. At Gerber, I learned the critical nature of traceability in the food system, which refers to the ability to trace an item’s history, application, use, and location, or its characteristics through recorded identification data. RFID technology and

methods can be used to capture such traceability data. Gerber was a pioneer of ingredient and product traceability.

9. After receiving my Ph.D. in May 1994, I worked as an Engineering Consultant at Lockwood Greene Engineers in Spartanburg, South Carolina until December 1996. At Lockwood Greene, I served in the process engineering department in their food and pharmaceutical group. I was a Consulting Engineer with responsibilities for the design and layout of food processes and facilities and how they interfaced with plant utilities and services. The traceability of food and pharmaceutical ingredients and products were an important aspect of my daily work.

10. Since January 1997, I have worked for Oklahoma State University in Stillwater, Oklahoma in various roles in the university's Biosystems and Agricultural Engineering department. Specifically, from June 2004 until May 2012, I was an Associate Professor, where I worked in the Robert M. Kerr Food & Ag Products Center (FAPC). The FAPC was built and staffed to help add value to agricultural products grown and processed in Oklahoma. I assisted clients with the engineering development of their food and agricultural processes and facilities. I developed food processing equipment and methods, including a patented size-reduction and separation device. I also taught and advised industrial clients through workshops and on-site visitation and graduate students on and off campus. Traceability has consistently been an important component of my work at Oklahoma State. Due to

the importance of animal production to the State (beef, pork and chicken), development and use of animal traceability has been essential. FAPC has its own abattoir and further process facilities that have always included identification and traceability systems for animals and animal products.

11. Since June 2012, I have been a Professor in Oklahoma State's Biosystems and Agricultural Engineering department. I continued to work in FAPC, expanding my knowledge and industry experience, including with respect to animal management and tracking and the use of RFID technology.

12. Moreover, in May 2003, I co-founded a company called PetMech, LLC in Stillwater, Oklahoma. PetMech makes a business of developing, pilot producing, and testing pet products, including chews, treats, and accessory products. Since 2015, PetMech began using "smart collars" in pet and animal studies where physiological data of the animal was sensed, recorded, and wirelessly communicated from the collar to a remote computer for long-term recording and analysis. Data collected included pulse, temperature, and movement. The information was used to study the use and efficacy of animal products.

13. I have significant experience researching and evaluating RFID tracking and sensor systems. Since 1997, at Oklahoma State's FAPC, I have continuously worked with the personnel at the FAPC, the Animal and Food Sciences Department, Biosystems Engineering, outside vendors, and consultants to develop traceability

systems for livestock, carcasses and meat products. From 2011 to 2014 I served as Co-Principal Investigator, along with Dr. Mike Buser, on a grant funded by the USDA-NIFSI. We studied the advancement of a whole-chain, stakeholder-driven traceability system for agricultural commodities that focused on beef and relied on RFIDs, sensor technologies, mobile devices, social media, and data management systems. In 2013, I coauthored a presentation about a stakeholder-driven whole-chain traceability system for beef cattle. In 2015, I coauthored an overview of our whole chain traceability system for beef that was presented to The China Agricultural University. In 2017, I coauthored a fact sheet on how traceability is used in beef carcass processing. My experience with dairy operations began in 1997 when I joined FAPC. Oklahoma has a significant dairy industry and I have been involved with dairy projects spanning the range of growing feed, processing feed, dispensing feed, milking, parlor design, refrigeration, pasteurizing systems, cleaning systems, fluid milk, ice cream, spreads, yogurt, cheese, and meat. Operations ranged in size from over 14,000 milking heads to as few as 50. I have taught workshops on dairy herd management and cheese-making internationally.

14. I am the inventor or co-inventor on 1 issued United States patent and one U.S. Provisional Patent Application. A full list of my publications, patents, and patent applications is included in Exhibit 2002.

III. MATERIALS CONSIDERED

15. My opinions are based on my years of education, research and experience, as well as my investigation and study of relevant materials. In forming my opinions, I have considered the materials I identify in this declaration and those listed in the Appendix below.

IV. LEGAL PRINCIPLES APPLIED

A. Person of Ordinary Skill in the Art

16. Some of my opinions refer to the perspective of a person of ordinary skill in the art (“POSA”) at the time of the invention. I understand that, for the purposes of institution, the Board determined that a POSA of the ’206 Patent would have had a bachelor’s degree in animal science, biological engineering, electrical engineering, or computer science, or a related or equivalent field, and three years of experience researching, developing, designing and/or evaluating RFID tracking and sensor systems for livestock management. Paper 18, 18-19. At ST Repro’s request, I have adopted and applied that definition herein. I consider myself an expert in this area.

17. In her declaration, Dr. Brown-Brandl further states with respect to a POSA:

I have been asked by counsel to consider the perspective of a POSA one year before the earliest September 15, 2009 filing date, September 15, 2008. My opinion is, however, that the knowledge of the POSA

relating to the technology claimed in the '515 patent was not significantly different in September 2008 versus September 2009.

Ex. 1003 ¶ 27, n. 1. I have also considered the perspective of a POSA as of September 15, 2008, in forming my opinions.

18. Dr. Brown-Brandl further states:

The POSA prior to September 2008,¹ would have routinely searched for scientific literature in library catalogs or online journals. The POSA prior to September 2008 would have also used internet search engines, such as Google, Google Scholar, Yahoo, and Scopus to locate relevant literature. I personally used such methods to identify relevant literature prior to September 2008, and continue to do so. The POSA prior to September 2008 would have searched for numerous types of sources, including, for example, scholarly peer-reviewed journal articles, theses, dissertations, conference publications and abstracts, textbooks, and articles.

Ex. 1003 ¶ 27 (footnote omitted).

19. To the extent Dr. Brown-Brandl's statement is intended to suggest that POSAs would have found every reference that she relies on in her declaration, I disagree. In particular, as explained in Section VIII, I have not seen sufficient evidence showing that a POSA would have found Trevvarthen.

B. Claim Construction

20. I understand that the terms of a claim must be interpreted or “construed” and that, after such construction, the claims are then compared to the prior art for purposes of determining anticipation and/or obviousness.

21. I understand that patent claim terms are given their ordinary and customary meaning as would be understood by one of ordinary skill in the art. I further understand that the ordinary and customary meaning always applies unless a different meaning is clearly indicated by the patentee (such as by an express definition of a term in the patent specification or clear disclaimer of subject matter during prosecution).

22. Also, I understand that in determining the ordinary and customary meaning, the term should be read in light of “intrinsic” evidence, namely the patent specification and prosecution history. If intrinsic evidence is not sufficient to inform a person of skill of the ordinary and customary meaning of a term, “extrinsic” evidence may be consulted (e.g., a dictionary).

C. Anticipation

23. I understand that for a patent claim to be invalid as anticipated, a single piece of prior art must disclose each and every element of the claim, arranged in the same manner as claimed. I further understand that, where a prior art reference does not disclose a particular element of a claim, it can still anticipate if the missing

element is “inherent” in the prior art reference, meaning that it is necessarily present in or is the natural result of the elements explicitly disclosed by the prior art. I further understand that inherency requires more than just the missing material being probably present or possibly present in the prior art.

D. Obviousness

24. I understand that obviousness is assessed from the view of a person of ordinary skill in the relevant art at the time the invention was made. I understand that the prior art does not need to render obvious every possible embodiment within the scope of the claim. I further understand that in determining whether a patent claim is invalid because of obviousness, one must consider the scope and content of the prior art, the differences between the prior art and the claimed invention, and the level of ordinary skill in the art. To make these assessments, I understand that surrounding circumstances, like “objective indicia” or “secondary considerations” should be evaluated.

25. I understand that an invention may be obvious because a skilled artisan pursues known options from a finite number of identified, predictable solutions, or because the claimed improvement is nothing more than the predictable use of prior art elements according to their established functions. I understand that a claim is obvious if the person of ordinary skill in the art was motivated or had reason to combine the teachings of the prior art with a reasonable expectation of success. And

I understand that obviousness does not require absolute predictability of success; only a reasonable expectation.

E. Public Accessibility of a Reference

26. I understand that petitioners have the burden of establishing that a reference qualifies as a prior art “printed publication.” I further understand that, for each reference they assert, petitioners must identify evidence sufficient to establish a reasonable likelihood that the reference was “publicly accessible” before the critical date of the challenged claims, and a reference is considered publicly accessible if it was disseminated or made available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, can locate it. I further understand that assessing public accessibility involves a case-by-case assessment of the facts.

V. THE '515 PATENT

A. The Patent Specification

27. The title of the '515 Patent is “Computer Implemented Animal Management System.” Ex. 1001. I understand the patent was filed as a “PCT” application on September 14, 2010 and issued on September 2, 2014. *Id.* The patent claims the benefit of Provisional Patent Application No. 61/276,723, filed on September 15, 2009. Based on the date of the provisional application, I have used September 15, 2009 as the date of the invention throughout this declaration.

However, as noted in Section IV.A above, I have also considered the perspective of a POSA as of September 15, 2008. My opinions herein are the same for either date.

28. The Abstract of the '515 Patent explains that the patent relates to “a computer implemented animal management program having modules which function to match animal information retrieved from a radiofrequency identification device(s) implanted in an animal(s) with animal information retrieved from a database of at least one computer to assess animal condition and time treatment events.” Ex. 1001 at Abstract. The Technical Field of the patent similarly relates to “a computer implemented animal management method which matches animal information retrieved from a radiofrequency identification device implanted in an animal with animal information retrieved from a database of at least one computer.” *Id.* at 1:13–18.

29. The Background of the '515 Patent also describes two significant problems in the prior art, namely:

A significant problem with RFID devices can be that the memory in which data can be stored is limited. As a non-limiting example, the 128 bit ROM above-described can only store one unique 38 digit identification number. Understandably, as the number of bits which can be encoded on a RFID increases so does the cost and the size of the RFID. Accordingly, the ROM of RFID devices utilized for tracking, locating and identification of goods remains between 100 and 200 bits

and certain ROM of RFID devices include even fewer bits such as 50-100 bits ROM, or even fewer bits.

Another significant problem with RFID devices may be that there is no computer implemented animal management system available for encoding and updating RFID information of an RFID implanted in an animal and integrating the RFID information with relational and storage databases in a server or remote computer for the purpose of remotely monitoring, tracking, sorting, diagnosing, or treating each RFID implanted animal.

Ex. 1001 at 1:65–2:16.

30. The patent then explains that “[t]he inventive computer implemented animal management system described herein addresses each of these problems by providing computer implemented functions which provide a method which matches animal information retrieved from a radiofrequency identification device implanted in an animal to animal information retrieved from a database of at least one computer.” *Id.* at 2:17–23. For example, “a broad object of the invention is to provide an inventive RFID implantable in an RFID object such as an animal or other asset and a RFID reader which can retrieve RFID information from the implanted RFID and computer implemented animal management program (also referred to as an animal management application) which provides executable program instructions in the form of various program modules each of which function to integrate retrieved RFID data with data in relational database tables and storage database tables or

analyze the RFID data and data from relational databases for each RFID implanted in an animal.” *Id.* at 2:27–38.

31. The claims of the patent describe a “computer implemented method of animal tracking” with specific steps to retrieve and integrate information from a radiofrequency identification (“RFID”) device “implanted in an animal.” *See, e.g.*, claim 1. After being retrieved, the animal information is integrated into a “logical expression” with additional information stored in a database, which can include “an amount of milk production information or an amount of days milked.” *Id.* The logical expression is then solved to provide alerts to farmers that are specific to the animals in their herds, including alerts that signal when a cow is ill. *See, e.g.*, Ex. 1001 at 13:51–14:44.

32. In my opinion, the claimed inventions allow farmers to track the status of their herd in real-time, which is particularly useful in the livestock industry where assets are high value (thousands of dollars per head of cattle) and remedies for issues are time dependent (e.g. retrieval of strays, diagnosis and treatment).

33. Dr. Brown-Brand quotes a portion of the specification referring to “conventional radiofrequency identification device (‘RFID’ or ‘RFID device’).” Ex. 1003 ¶ 89 (citing Ex. 1001 at 1:22-56). To the extent Dr. Brown-Brandl is suggesting that the animal tracking methods claimed in the ’515 Patent consist of conventional components, I disagree. The claims comprise unconventional components arranged

in unconventional ways, as demonstrated by my comparison of the claims to Petitioners asserted art below.

34. Moreover, when the patent uses the word “conventional,” it is clearly describing prior art RFID devices only, and not any aspect of the claimed invention. Here is the full context of the statement that Dr. Brown-Brandl quotes, which is the first sentence of the “BACKGROUND” section of the patent:

A conventional radiofrequency identification device (“RFID” or “RFID device”) is an object that can be attached to or incorporated into a product, animal, or person typically for the purpose of locating and identification of that object using radio waves.

Ex. 1001 at 1:22–26. This would not suggest to a POSA that the claimed systems are conventional in any way. In fact, as explained above, the background describes significant problems with such prior art and then explains that the disclosed inventions solve those problems. *See, e.g.*, Ex. 1001 at 1:22–2:38.

B. The Challenged Claims

35. The Petition challenges claims 1–4 and 15–25 of the ’515 Patent (referred to below as the “Challenged Claims”). Independent claim 1 is reproduced below. In the left column, I include the shorthand identifier for each “claim element,” which I will refer to throughout this declaration.

1[Pre]	1. A computer implemented method of animal tracking, comprising:
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1[A]	connecting a computer to an RFID device reader;
1[B]	reading an RFID device implanted in an animal with said RFID device reader;
1[C]	retrieving an amount of animal identification information from said RFID device implanted in an animal;
1[D]	linking an amount of animal information of said animal stored in a data base of said computer to said amount of information retrieved from said RFID device implanted in said animal, said amount of animal information stored in said data base of said computer comprising an amount of milk production information or an amount of days milked;
1[E]	converting said amount of animal information of said animal stored in said database of said computer linked to said amount of information retrieved from said RFID device implanted in said animal into one or more logical variables;
1[F]	inserting at least one of said plurality of logical variables into at least one logical expression; and
1[G]	obtaining a logical value relating to said animal.

36. The remaining challenged claims (2–4 and 15–25) all depend from claim 1 and specify various additional limitations.

37. For all the reasons herein, I disagree with Dr. Brown-Brandl’s opinion that any of the Challenged Claims are anticipated or obvious.

VI. CLAIM INTERPRETATION – “IMPLANTED IN AN ANIMAL”

38. I have been asked to analyze the plain and ordinary meaning of “implanted in an animal” in the claims of the ’515 Patent from the perspective of a POSA. For the reasons explained below, it is my opinion that a POSA would understand “implanted in an animal” in the claims of the ’515 Patent to mean “implanted within the animal.”

39. It is my understanding that one should first review and analyze the claim language itself when interpreting claims. Based on my review of the claim language in the ’515 Patent, my opinion is that POSAs would understand that “implanted *in* an animal” means implanted *within* that animal, which is distinct from “implanted *on* an animal.” POSAs would have understood that the word “in” denotes a location “within” another object. In my opinion, a layperson would also have this understanding. The claim language does not provide any reason for a POSA or layperson to deviate from this commonly understood and widely accepted meaning of “in.” The straightforward application of “in an animal” and “in a plurality of animals” in the claims would refer to a location “within” the animal or animals.

40. The specification supports that “implanted in an animal” and “implanted in a plurality of animals” in the claims refers to implantations *within* the animal, and not *on* the animal. For example, the ’515 Patent describes an

embodiment in which the RFID device is located “in the hollow inside of a bolus” that can be “ingested” by cattle and “retained in a part of the stomach”:

Now referring primarily to FIGS. 1 and 3, as to certain embodiments of the computer implemented animal management system, the RFID (19) can be located **in the hollow inside of a bolus (79)**. Certain configurations of **the bolus (79) can be ingested by certain RFID objects (39), such as cattle and be retained in a part of the stomach;** although the invention is not so limited.

Ex. 1001 at 10:16–22. The POSA would understand that, in the patent’s “bolus” configuration, the RFID device is within the bolus that is ingested and retained within the cow’s stomach, and therefore the RFID device is “within” the animal. The text of the patent is therefore consistent with and supports my above analysis of the plain language of the claims.

41. This bolus configuration in which the RFID device is within the animal is further illustrated in Figure 3 of the ’515 Patent. *See* Ex. 1001 at Fig. 3. The patent describes Figure 3 as follows:

FIG. 3 is a block diagram which shows **a particular embodiment of the invention which includes a bolus** containing at least one sensor which provides sensed RFID object information and an RFID to which sensed RFID object information can be encoded and subsequently collected by an RFID reader.

Ex. 1001 at 3:13-18. The patent further explains that:

A first bit segment (71) of the RFID device (19) **implanted in an animal** (40) can be encoded or re-encoded with an amount of RFID object identification information (80) (which can be a bolus identification number (81), animal identification number (82), or the like). A second bit segment (72) of the RFID (19) can be encoded or re-encoded from time to time with sensed RFID object characteristics (84) received from a sensor (83) which can be located within the bolus (79) or otherwise implanted within the RFID object (39) whether an animal (40) or an asset (41).

Ex. 1001, 10:22-38. The patent's description of Figure 3 shows that, when discussing an internal RFID device (i.e., one contained inside of a "bolus"), the inventors chose to use the exact same language as the claims, namely "implanted in an animal." Using the phrase "implanted in an animal" in the specification to describe an internal device supports my opinion that the claims require an internal device when using the same language.

42. On the other hand, the patent does *not* use the phrase "implanted in" when more generally describing devices that are not necessarily internal to another object. This contrast in language further shows that the inventors used the phrase "implanted in" an animal to specifically refer to a location within the animal. For example, the specification states:

[T]he functionalities described herein can be applied in general to asset tracking systems, asset management system in which an RFID can be ***attached, applied, implanted or otherwise coupled to an asset*** (41)

such as goods whether being transported or in inventory, packages, component parts whether in a manufacturing process or during transit, or the like.

Ex. 1001 at 8:12–16. Here, the patent is explaining that some of the disclosed functionalities can be applied to systems in which the RFID device is not necessarily located within an animal, such as “asset tracking systems.” In describing such systems, the patent does not use the word “in” to describe the RFID device’s location and instead says the RFID device “can be attached, applied, implanted or otherwise coupled to an asset (41) such as goods.” That is, when the inventors were not describing an internal device, they chose not to use the phrase “in an animal,” and instead used more expansive language. A POSA would view this contrast in language as further demonstrating that “implanted *in* an animal” refers to a location within the animal.

43. I have been asked to analyze the following language in the patent:

The term RFID (19) for the purposes of this invention can be any type of radiofrequency identification device as above-described or otherwise which can be attached, incorporated, implanted, imprinted, or held (individually and collectively referred to herein as “implanted”) on or within an RFID object (39).

Ex. 1001 at 7:66–8:4. I understand that Petitioners have argued that this language is definitional in nature and that it would allow “implanted in an animal” in the claims to include devices implanted *on* an animal. Even if I were to assume that this

language is definitional, I disagree that any such “definition” would allow “implanted in an animal” in the claims to include devices implanted *on* an animal. Instead, this language supports my opinion that a POSA would understand “implanted in an animal” to refer to a location within the animal. By stating “(individually and collectively referred to herein as ‘implanted’),” the specification makes clear to a POSA that it is referring to the word “implanted.” *See* Ex. 1001 at 7:66–8:4. Therefore, to the extent the patent is defining a term, that term would be “implanted.” It would not be defining “implanted in an animal” or “implanted in a plurality of animals,” which is what is recited in the claims. In other words, equating an alleged definition of “implanted” to the entire phrase “implanted in an animal” would ignore and render superfluous the words “in an animal” in the claims. A POSA would have given meaning to those words. Specifically, the POSA would have understood that “implanted *in an animal*” requires that the device be implanted within the body of the animal. This would be the case even if “implanted” on its own were defined more broadly.

44. A POSA would also view the text relied on by Petitioners as distinguishing between devices that are implanted “on” versus implanted “within,” which shows that “implanted on” and “implanted within” (or “implanted in”) have different meanings. Specifically, the text refers to RFID devices “*on or within* an RFID object.” Ex. 1001 at 8:4. A POSA would understand that “implanted in” in the

claim is referring to the latter device that is “within” an object (specifically an animal).

45. Dr. Brown-Brandl’s opinions in her declaration are consistent with my interpretation of the claims. For example, in analyzing claim 2—which requires “a plurality of RFID devices implanted in a plurality of animals”—Dr. Brown-Brandl stated that a “POSA would have understood that a bolus, by definition, is implanted in a cow, with a rumen bolus implanted via ingestion in the cow’s first stomach compartment.” Ex. 1003 at ¶ 99. Stating that a bolus is “implanted in” a cow “by definition” because the bolus is “implanted in the cow’s first stomach compartments” demonstrates her understanding that the device must be within the animal, such as in its stomach, in order to be “implanted in an animal” as claimed.

46. Dr. Brown-Brandl further stated that Trevarthen discusses *one* device that is an example of “implantable RFID devices with physiological sensing capabilities, including for temperature.” Ex. 1003 at ¶ 99. That one device, in Dr. Brown-Brandl’s opinion, was a “Bio-thermo RFID microchip.” *Id.* (“Trevarthen cites one such device, the Bio-thermo RFID microchip.”). Trevarthen explains that the Bio-thermo RFID microchip is an “under the skin” sensor. *Id.*; Ex. 1005 at 24 (describing the Bio-thermo RFID microchip as “injected into the animal (under the skin)”). Such an under the skin sensor that is injected into the animal would be located *within* the cow, not on it. By citing this as Trevarthen’s “one” example of a

device “implanted in a plurality of animals,” as opposed to Trevarthen’s discussion of external ear tags for example, demonstrates Dr. Brown-Brandl’s understanding that “implanted in an animal” and “implanted in a plurality of animals” requires an RFID device within the animal(s).

47. Similarly, when addressing whether Laitinen discloses a device “implanted in an animal,” Dr. Brown-Brandl emphasizes Laitinen’s reference to sensors that “can be ‘an *implant* inside the animal.’” Ex. 1003 at ¶ 150 (emphasis in original). Relying on devices that are described as an implant *inside* an animal demonstrates that Dr. Brown-Brandl interprets “implanted in an animal” and to require a device inside or internal to the animal(s). This is consistent with my opinion that the claims require a device located within the animal.

VII. SUMMARY OF THE ASSERTED ART

A. Trevarthen (Ex. 1005)

48. “Trevarthen” is a 169-page undergraduate thesis authored by Mr. Adam Trevarthen. The exhibit states that the thesis was provided “in fulfilment of the requirements for the award of the degree Bachelor [sic] of Information and Communication Technology” at the University of Wollongong in Australia. Trevarthen at Abstract (“Publication Details”). I note that, to be consistent with Petition and Dr. Brown-Brandl’s declaration, the page numbers from Trevarthen

cited herein are Trevarthen's original page numbers, not the "stamped" exhibit page numbers.

49. Petitioners and Dr. Brown-Brandl use Trevarthen in Grounds 1–3. For Ground 1, they argue that Trevarthen, on its own, anticipates or renders obvious claims 1–2 of the '515 Patent. For Ground 2, they argue that Trevarthen in combination with Brune renders obvious claims 3–4. For Ground 3, they argue that Trevarthen in combination with Rollins renders obvious claims 15–25. As explained below, it is my opinion that Petitioners and Dr. Brown-Brandl have not provided evidence showing that Trevarthen was publicly accessible by the patent's priority date. Therefore, based on my understanding of the law, Trevarthen does not qualify as prior art to the '515 Patent for these proceedings and cannot be used to show that the Challenged Claims are unpatentable. It is also my opinion, as explained below, that Trevarthen does not disclose or render obvious any of the Challenged Claims.

50. The Trevarthen undergraduate thesis consists of eight chapters. Trevarthen at ii-v (Table of Contents). Chapter 6 discusses a "theoretical framework" proposed by Trevarthen with "possible enhancements and future developments" for hypothetical dairy farms. Trevarthen at ix (Abstract). In my opinion, a POSA would not consider Trevarthen's "theoretical framework," overall, as a standalone animal management system. Chapter 6 is a series of sub-sections that consists primarily of

separate discussions of potential discrete individual features of future hypothetical systems. For example, Trevarthen describes its theoretical framework as follows:

While the cross-case comparison study will be designed so as to be functional and practical, ***aspects of it may be considered idealistic*** in the current farming and technological environment. As such, ***the framework suggested may be considered a possible long term goal*** for dairy farm management practices, considering developments in electronic identification technology such as RFID technology are expected to bring about a reduction in costs for the technology as well as increased functionality. This framework may also serve to provide ***possible direction for future research*** into this field.

Trevarthen at 40 (emphasis added); *see also id.* at 8–9.

51. As another example, Trevarthen further states that:

Utilising these case studies as a basis, a ***theoretical framework*** for implementing RFID on dairy farms is then proposed, identifying mandatory and optional components for RFID implementation. ***Possible enhancements and future developments*** for RFID components are also identified and suggested throughout this framework.

Trevarthen at ix. Such statements, e.g., calling the framework “theoretical,” “idealistic” and a “possible long term goal” that could provide “possible direction for future research” or “possible enhancements and future developments” are speculative. They demonstrate to a POSA that Trevarthen’s theoretical framework, overall, was not achievable as a complete “system” when it was written. These

statements also show, more generally, that Trevarthen’s theoretical framework does not disclose a single cohesive computer-implemented animal management system.

52. Notably, as discussed more below, for several claim elements, the Petition and Dr. Brown-Brandl rely on Trevarthen’s possible future and idealistic features that were not actually incorporated into any existing or proposed RFID-based management system. For example, Petitioners and Dr. Brown-Brandl rely on Trevarthen’s discussion of the potential use of “milk meters” in combination with “automated feed bins” to suggest that integrating milk production information with sensed animal data acquired from an RFID device would have been obvious. But Trevarthen explicitly states that doing so was “[b]eyond their current abilities” and never discusses the integration or potential integration of such data. Trevarthen at 109, which is the start of § 6.3.3.2 (titled “Enhancing Capabilities”). In full, Trevarthen states, “Beyond their current abilities, it is believed that future development of these automated feed bins could provide enhanced benefits for the farmers. Firstly, the use of milk meters to record the amount of milk produced by each cow at every milking session will also enable greater possibilities for extending the capabilities of feed bins.” *Id.* A POSA would understand this to mean that using milk meters in this manner was not achievable in the art at the time.

53. As quoted above, Trevarthen states that he used “case studies as a basis” for the proposed “theoretical framework.” *See* Trevarthen at ix. These two case

studies are discussed in Chapters 4 and 5 of Trevarthen, and they involve systems employed at existing dairy farms in Australia. Notably, the two “case study” systems are separate, and are discussed completely separately, from Trevarthen’s proposed theoretical framework (which is not an actual or existing system). Specifically, Trevarthen states that he “investigate[d]” the “Strong Dairy Farm” and the “Cochrane Dairy Farm” in Australia, which employ different levels of RFID technology. *See* Trevarthen at Chapter 4 (describing the Strong Dairy Farm); Chapter 5 (describing the Cochrane Dairy Farm). As explained further below, Grounds 1 and 2 in the Petition are based on a combination of aspects of the two case studies and on Trevarthen’s theoretical (and speculative) framework. In addition, neither Dr. Brown-Brandl nor Petitioner argue that the concepts discussed in Trevarthen’s Chapter 6 describing his theoretical framework for the use of RFIDs on dairy farms must be applied in the practical applications described in Chapter 5, which discusses the workings of the Cochrane Dairy. For example, the theoretical framework has brief discussions of boluses and microchips, in addition to discussion of basic ear tags. Ex. 1005, § 6.2.1, 99. The Cochrane Dairy uses RFID ear tags for identification only. *Id.* 1005, 5.1.1. POSAs would not have had a reason to include the boluses and microchips briefly discussed in Chapter 6, for example, in Cochrane Dairy’s system.

B. Laitinen (Ex. 1006)

54. “Laitinen” is a U.S. Patent titled “Surveillance System for Animals.” For Ground 3, Petitioners and Dr. Brown-Brandl rely on Laitinen in combination with “Buchanan” and “Liao” in arguing that claims 1–4 and 6 are obvious. For Ground 4, they rely on Laitinen in combination with “Brune” in arguing that claims 17–20 are obvious. As explained below, Laitinen in combination with any other asserted reference does not disclose or render obvious any of the Challenged Claims.

55. Laitinen discusses a “surveillance system” for allowing governments and other interest groups to monitor groups of animals at a “global level.” Laitinen at Abstract. Laitinen’s surveillance system requires “three technology levels,” namely the “local, global and pico level[s],” which Laitinen describes as “the basic principle of a system based on the invention.” Laitinen at, 3:21–27.

56. In a section titled “Background of the Invention,” Laitinen describes examples of prior art systems, such as:

The US patent application US2001/0016681 describes a system with which it is possible to keep health records of individual animals and to, for example, obtain information about the medication used for treating each animal. Animal identification is based on a code (e.g. bar code) in the earmark, which can be read with a manual scanner. Patent U.S. Pat. No. 5,818,354, on the other hand, features a telemetric system for the individual surveillance of the physical condition of each animal in a larger group, as indicated by heart rate and body temperature. Each

animal wears a collar with sensors and a transmitter that sends the measured data to a portable receiver.

Laitinen at 1:63–2:8.

57. Laitinen then describes “downsides” of such systems, namely:

One of the downsides of these known solutions is their locality, that is to say, the fact that they offer surveillance and other information only locally, within a certain environment (e.g. one producer) and with regard to a certain purpose. Practicing animal husbandry always necessitates the interaction of different reference groups with differing interests as far as the size of the group to be controlled and the desired measures are concerned. In addition to tenders and farmers, authorities and specialists of different fields, for example, often partake in the processes and if they wish to single out the animals of a certain producer, or a specific animal, for control or other measures, it is nowadays necessary that they go physically to the farm in question.

Laitinen at 2:9–12.

58. A POSA would understand this as disparaging systems that employ a different “basic principle” than the three-level hierarchical system discussed in Laitinen. Laitinen further disparages such systems for requiring authorities and specialists to “go physically to the farm in question” to control a particular farm or its animals. *Id.* at 2:17–22. Laitinen states that it “aims to create a new kind of a surveillance system which is not hampered by the before-mentioned flaws,” which a POSA would have understood is based on the above perceived deficiencies. *Id.* at

2:23–27. Additionally, according to Laitinen, “[p]racticizing animal husbandry always necessitates the interaction of different reference groups with differing interests as far as the size of the group to be controlled and the desired measures are concerned,” which Laitinen believes is not achievable without his specific three-level structure. *Id.* at 2:13–17. A POSA would therefore be discouraged from following a path other than the three-level hierarchical system proposed by Laitinen.

59. The three “levels” in Laitinen are described as three distinct systems: the “pico level” system, the “local level” system, and the “global level” system. Laitinen at Figs. 1–3, 3:21–5:3.

60. The pico level system includes a device used “directly with the animals.” Laitinen at 3:28–29. Laitinen further identifies two distinct pico-level devices, one that is “external” and one that is “implanted inside the animal’s tissue (100b).” *Id.* at 5:38–43.

61. Laitinen states that the external device can “measure the animal’s body temperature (with a temperature [s]ensor) or movements (various motion [s]ensors, such as acceleration [s]ensors), or determine the animal’s location.” *Id.* at 5:44–49. However, Laitinen does not explain how the “body temperature” or “movement” are measured. Laitinen also does not explain how the “animal’s location” or “movement” is determined. Nor does Laitinen identify specific devices capable of taking such measurements.

62. Petitioners and Dr. Brown-Brandl rely only on the use of an external device in a “heat control” application. Laitinen at 8:5–15. For that application, Laitinen states that a “[c]ensor” measures “body temperature and movement” and triggers an alarm at the pico level when preset “alarm limit(s) have been reached.” *Id.* at 8:5–15. Laitinen is necessarily discussing only an external device because the only device that Laitinen describes as capable of measuring temperature and movement is the “external device.” *Id.* at 5:38–49; Fig. 3. Likewise, the only device that Laitinen describes as having an “alarm limit,” such as the one used in the heat control application, is the “external device.” *Id.* at 5:60–64. Notably, however, Laitinen does not provide examples of an alarm triggered by entering variables into and solving a logical expression, which is required by the ’515 Patent claims.

63. Laitinen also refers to “implanted” or “internal” devices. Laitinen at 3:51–62; 5:38–43; 5:50–6:4; Fig. 2. In particular, Laitinen does not explain, discuss, or suggest that its internal device measures temperature. Nor does Laitinen explain, discuss, or suggest that any internal device measures location or movement. Also, Laitinen does not describe its internal device as featuring any “alarm limit.” The only functions Laitinen associated with the internal device is that it enables “the use of an EKG analysis for the surveillance of the animal’s heart rate or an EMG (Electromyography) conveying its muscular tension or level of fatigue,” as well as “the use of optical [s]ensors for the measuring of oxygen saturation, for instance.”

Laitinen and 5:50–55. In my opinion, these limited uses of Laitinen’s internal device are what would allow it to “use[] very little power (about 1 mW),” as discussed by Laitinen. *Id.* at 58–60. In my review of Laitinen, I did not find a description of any particular embodiment or application that employs the internal device.

64. Notably, it is not clear how or where the “internal device” mentioned in Laitinen would be inserted or how it would measure data. At the time of the invention, POSAs would have most likely understood an “internal device” to imply an under-the-skin device. *See, e.g.*, Ex. 1006 at 5:38–55. As discussed below, POSAs would not have had reason to use such devices to measure temperature with a reasonable expectation of success.

65. The “global level” tier is critical to the Laitinen system. The global level is what receives data from multiple local levels to achieve the “surveillance” objective at the core of Laitinen’s system.

66. One example of a feature contained in the global level is a so-called “inverse function $x=f^l(y,z)$.” Petitioners and Dr. Brown-Brandl cite this “inverse function” as an alleged equation for analyzing data acquired from multiple local levels. *Id.* at 7:6–9, 7:35–56. In particular, Petitioners and Dr. Brown-Brandl rely on the so-called inverse function’s incorporation of “temperature” data. As noted above, Laitinen claims that such data is only acquired with its “external” device. Additionally, it is noteworthy that the “inverse function” as described in Laitinen is

not a mathematical construct or logical expression as suggested by Petitioners and Dr. Brown-Brandl. Instead, the specific “inverse function” described in Laitinen represents an output from a “self-learning system” (*see* Ex. 1006 at 6:56), also known as a Counter Propagating Network (*Id.* at 7:38–39), or Neural Calculator (*Id.* at Fig 3). I discuss this in more detail below.

C. Brune (Ex. 1008)

67. “Brune” is a U.S. Patent titled “Method of Determining a Physiological State of a Ruminant Animal Using an Ingestible Bolus.” According to Brune’s “Field of the Invention,” it “relates to a method of monitoring the core body temperature of an animal, and, more particularly, to a method of monitoring the core body temperature of a ruminant animal using an ingestible bolus.” EX1008 at 1:13-15. According to Brunes’s “Summary of the Invention,” it “provides a method of determining a physiological state of a ruminant animal by mathematically analyzing at least one portion of a history of data representing sensed temperatures within a stomach of the ruminant animal.” *Id.* at 1:63–67; *see also id.* at 2:1–16. In every example provided in Brune, the only specific type of “data” employed is temperature. *See also, e.g., id.* at Abstract (“The physiological state of the ruminant animal is determined using the mathematically analyzed temperatures.”).

D. Liao (Ex. 1010)

68. “Liao” is PCT Publication named “Dairy Farm Decision Support System.” In a background section, Liao explains difficulties in “dairy farm management decision-making”:

Dairy farm management decision-making is generally a complex task, which is difficult to model mathematically with a satisfying degree of accuracy. Namely, in many situations, the rules underlying a particular decision are not well defined, or cannot be formulated in concrete terms by the farmer. Instead, these types of decisions may be highly influenced by the farmer's intuition, or tacit experience. For example, even if it normally is appropriate to inseminate a cow when she is approximately 60 days in milk, this is not a rigid rule. On the contrary, many other factors may have impact on an actual insemination decision for a particular animal. However, often the farmer himself/herself is not explicitly aware of exactly which these factors are, or how they influence the insemination decision. Therefore, it may be practically impossible to formulate a Boolean, or other mathematical model, for the decision process.

Moreover, even if such a model could be formulated it would typically only be applicable to a particular farm or region. Other farms, regions or countries might require completely different models to satisfy the needs of the farmers who are active there.

Ex. 1010 at 1:5–2:2. In its “Summary of the Invention,” Liao further states that his object is “to provide a solution, which alleviates the above problems and thus offers

explicit decision support in the process of managing a dairy farm herd of livestock.”
Id. at 2:26–30.

69. Liao’s attempt at a “solution” involves a “rules engine” and a “decision engine.” *Id.* at Abstract, 2:31–3:2. The “rules engine” receives “a first set of input parameters reflecting a decision basis for a particular type of dairy farm decisions, receive user-generated input data representing a number of manual decisions in respect of the first set of input parameters, and generate a set of decision rules based on the first set of input parameters and the user-generated input data.” *Id.* at 3:2–8. Examples of input parameters, according to Liao, include, for example, “peak milk yield,” “days in milk (DIM),” and “a heat-detection status,” among several other variables potentially relevant to decisions relating to cattle on a farm. *See, e.g., id.* at 5:14–27.

70. Liao’s purported “decision engine” receives “dairy farm data reflecting animal parameters of the same type” as the rules engine and is adapted to “apply the set of decision rules to the dairy farm data, derive at least one proposed dairy farm decision of the particular type, and forward output data reflecting the at least one proposed dairy farm decision to the output interface for presentation to a human user.” *Id.* at 3:8–14.

71. An example of Liao’s so-called “decision engine” is an “insemination decision support” in which the “dairy farm data” includes parameters such as

“number of days in milk, a peak milk yield in a latest lactation, a conception rate of any previous lactations (i.e. the average number of inseminations required for the previous conceptions), a heat-detection status, a time period since a last heat date, a number of lactation periods, a body condition scoring, whether the animal has been selected for culling, and/or an activity status.” Ex. 1010 at 5:14–23. Liao’s decision engine supposedly produces “a first output parameter indicating the animal identity, and a second output parameter reflecting whether the animal having this identity should be inseminated within a particular time period.” *Id.* at 5:23–27. This “decision,” according to Liao, is based on manual inputs provided by the user (e.g., a farmer) to the rules engine when provided randomly-generated data for each of the parameters, allowing the user to provide the “decision” he would have made under those circumstances. *Id.* at Abstract, 3:2–8, Liao further explains that his system supposedly provides user-generated “decisions” to a series of randomly-generated data sets that “trains” the system to develop “rules” that can be applied to actual data sets of the same type that was randomly generated.

72. Liao never explains the precise source of the “dairy farm data” or gives any details on the sensors. In one sentence in the Summary of the Invention, Liao refers to “animal-related sensor means” but never explains exactly what the sensors are and what they are capable of sensing.

73. Below is the only other paragraph in Liao's specification where he refers to a "sensor":

Preferably, the system also includes a data collection unit 135, which is connected to, by wire or wirelessly (e.g. by means of radio-, optical- or ultrasonic transmission resources), a number of animal-related sensor means, (not shown) i.e. sensors located on/in the animals, or at implements interrelating with the animals, such as milking apparatuses. Thereby, the data collection unit 135, may receive a number of signals $d_1, d_2, \dots, d_n$ registered by these sensor means, and based thereon produce at least a sub-set of the dairy farm data D. It is also desirable that the input interface 130 is adapted to receive manually entered animal parameters, and forward these parameters to the decision engine 120 to represent at least a sub-set of the dairy farm data D.

Ex. 1010 at 13:9–21. Again, he provides no specific details on what the sensors are capable of sensing.

74. Liao further explains that "another preferred embodiment" is where "the input interface is adapted to receive manually entered animal parameters, and forward these parameters to the decision engine to represent at least a sub-set of the dairy farm data." In that embodiment, "the decision basis may either be supplemented manually, or the entire decision basis may be entered manually."

75. Liao never explains the source of input parameters "days in milk," "peak milk yield," or "heat-detection status" or how they are acquired and input into Liao's system. He never describes a sensor or any mechanism for acquiring them or

entering them automatically. In view of this, a POSA would most likely understand them to be determined manually by a farmer and entered manually into the decision engine.

E. Buchanan (Ex. 1011)

76. Petitioners and Dr. Brown-Brandl also rely on “Buchanan,” a PCT Publication titled “Farm Management Software.” They use Buchanan in combination with Laitinen because Buchanan supposedly discloses inputting “milk production information” in a database. But neither Petitioners nor Dr. Brown-Brandl argue that a POSA would have (or could have) incorporated the data from Buchanan into a “logical expression” or to generate a “logical value” as required by the claims. *See* Pet. at 47–51; Ex. 1003 at ¶¶ 160–168.

F. Rollins (Ex. 1037)

77. Petitioners and Dr. Brown-Brandl further rely on a U.S. Patent Publication “Rollins,” which is titled “Systems and Methods for Collecting and Managing Animal-Related Information.” Rollins describes a computer program for storing and displaying “animal-related data,” such as the animal’s birthdate or weight that is input by a user. *See, e.g.,* Ex. 1037 at Abstract, Figs. 5, 35, ¶¶ 14–19. Based on my review of Rollins, there is no suggestion or description in Rollins of any system or device capable of sensing animal information or using logical expressions to determine a logical value regarding an animal. Petitioners and Dr. Brown-Brandl

use Rollins in combination with Trevarthen in Ground 3 and in combination with Laitinen, Buchanan, and Liao in Ground 6. They use Rollins mainly for limitations missing from Trevarthen and Laitinen in dependent claims 15–24. *See, e.g.*, Pet. at 26–35, 54–61; Ex. 1003 at ¶¶ 131, 134-145, 179-193. As explained below, Petitioners fail to explain how Rollins addresses the various other missing elements and other deficiencies in the primary asserted references, Trevarthen and Laitinen.

VIII. PUBLIC ACCESSIBILITY OF TREVARTHEN

78. In my opinion, based on my understanding of the relevant standards, Petitioners and Dr. Brown-Brandl do not show that Trevarthen qualifies as prior art to the Challenged Claims of the '515 Patent.

79. I understand that Petitioners allege that a copy of Trevarthen was “available for download on October 22, 2006” because the University of Wollongong’s “Research Online” tool “ensures that ‘a digital copy’ of each reference of [sic] published in the digital repository ‘is available universally on the Internet and located through search engines such as Google and Yahoo.’” *See* Pet. at 7–8 (quoting EX1031, “Munford” ¶¶ 16–20 (citing Ex. 1027, 149)). Petitioners also state that “[o]nce a publication, like Trevarthen, is ‘loaded onto Research Online [it] is usually available on Google the following day.’” Pet. 8 (citing Munford, ¶19 (citing Ex. 1030, Ex. A)). I have seen no evidence that Trevarthen itself was actually “available universally on the Internet and located through search engines such as

Google and Yahoo.” In fact, as discussed below, I performed my own Google search using Dr. Brown-Brandl’s suggested search terms and found that Trevvarthen was *not* locatable on Google before September 15, 2008 (or September 15, 2009).

80. I further understand that, in addition to certain paragraphs from Dr. Brown-Brandl’s declaration, Petitioners rely on three pieces of evidence:

- **Ex. 1031:** Declaration of June Munford, a librarian;
- **Ex. 1030:** Affidavit of Nathaniel E Frank-White relating to “Wayback Machine” archives; and
- **Exs. 1028–1029:** an International Search Report of the Australian Patent Office.

81. In my opinion, as explained below, none of this evidence independently or collectively shows that Trevvarthen was publicly accessible before September 15, 2008 (or September 15, 2009) as argued by Petitioners and Dr. Brown-Brandl.

A. Qualifications for Assessing Public Accessibility

82. In view of Petitioners’ submission of “Petitioner’s Objections to Evidence Filed with the Patent Owner Preliminary Response” (Paper 18), I have been asked to explain my qualifications for assessing the public availability of documents and how the date-limited Google searches I perform below accurately reflect the results of a Google search performed before the patent’s priority date and can accurately determine whether a document was publicly available on the internet and accessible before a specific date.

83. First, with respect to my qualifications for assessing the public availability of documents, I note that my opinions regarding the public accessibility of Trevarthen herein are in response to the argument presented by the Petitioners, which was that Trevarthen would have been available on Google and located using keyword searches. I am highly qualified to assess the public accessibility of documents on Google using keyword searches. As an academic with more than 30 years of experience conducting research at a university level, I regularly use internet search engines in my work. The search engine I use most is Google, which I have regularly used for over 20 years. I also use other search engines, such as Yahoo, Google Scholar, Google Patents, and EBSCOhost. The ability to search for articles, research publications, patents, and other documents and information using search engines such as Google is a fundamental skill required for my academic research.

84. As part of my work with search engines, I have become very familiar with Google's date-limited search feature, including by using its "custom date range" tool, which provides a reliable and accurate way to assess whether a particular document was publicly accessible on Google before a specific date or within a specific date range. I have been using Google's date-limited search feature to research documents and information in my work for approximately 12 years. For example, I often use this feature to identify whether a concept or reference became available before or after a certain date related to patent research, literature reviews,

and writing peer reviewed publications. With respect to patent research, I have often sought to determine whether a concept was available to the public before a certain date to assess whether it makes sense for me, or my clients (e.g., food and agricultural product developers), to pursue a patent. For making such determinations, I have used Google's date-limited search feature to perform keyword searches related to the concept to assess what existed in the art before a particular date. With respect to literature reviews and peer reviewed publications, I have, for example, used Google's date-limited search feature to identify and group literature according to time periods. This method is helpful to determine the intensity of research work over a desired timeline, which facilitates identification of key articles, researchers and institutions. In fact, I teach such a process to my graduate students to help them with their literature review. I suggest they cast a very wide net using broader key words and longer date ranges when they research far into the past, and then focus it down, using a smaller date range and more focused key words, as they approach the present time. One reason for this approach is that there are generally fewer researchers and fewer publications the farther back ones goes. Google's date-limited search feature is a reliable tool that allows for such an approach. As another example, when writing my own articles, some peer reviewers have encouraged me to cite references primarily from within a specified range of years, such as the previous 5 or 10 years. In my experience, Google's date-limited searching has been

reliable to identify references available during a specified time period, as well as whether references are sparse or unavailable. I drew on such experiences to use Google to assess the public availability of the Trevarthen reference as described below.

85. As one specific demonstration of my familiarity with using time-limited Google searches, as well as the reliability of such searches, in 2015, I sought to confirm that the FDA had provided new guidance related to the production of “acidified foods” from between January 1, 2000 and September 17, 2013. I needed to limit the date to that range because September 17, 2013 was the date of an incident of concern, and I estimated that process guidance older than about 13 years before the incident would be obsolete. Therefore, I performed a date-limited Google search by entering keywords such as “FDA,” “acidified,” and “guidance” and setting the “custom range” in Google to 1/1/2000 to 9/17/2013. Because I was able to locate a credible reference during my review of the search results, I determined that specific, new guidance for the production of acidified foods was indeed published and accessible between 1/1/2000 and 9/17/2013, and the identified reference was important to the outcome of the incident of concern. In that instance, I used Google’s date-limited search feature to reliably identify whether a document was available online and locatable using a Google keyword search during a specific range of time.

86. Second, as demonstrated through both my own professional reliance on date-limited Google searches and third-party examples and tutorials, the “custom date range” tool on Google is a known technique to reliably provide search results that would have been produced within the specified date range. In other words, the “custom date range” tool is a search technique that “provides the best representation of what websites Google served during the selected time frame.” EX2006 at 13-14 (“Economic Damages” guide explaining how economic analysts utilize Google to review search engine results pages (“SERPs”) “as of a past date” or to “review historical SERPs in Google” by “choos[ing] a custom date range that fits the relevant time frame to find historic results based on webpages published in that time frame”); *see also* EX2007 (presentation from Goizueta Business Library at Emory University explaining how to become a “Google Power User,” which includes how to use the “custom date range” tool to limit returned content to a specified date range).

87. Researchers in a variety of fields in addition to my own rely on date-limited searches to conduct research in a given time period. For example, one researcher used Google’s “custom range” tool in analyzing whether an animal’s “charisma” impacted federal funding for that animal under the U.S. Endangered Species act, using Google search results during a specific time period as a “proxy” for charisma. EX2008 at Abstract, 7 (explaining that, “under Google’s ‘Tools’ menu,

‘Any Time’ was chosen, and then, ‘Custom Range’ and the range of dates for search results were set to between January 1st 2002 and December 31st 2012”).

88. The examples provided in this declaration, as well as my own experience, further confirm that the date-limited Google searches I performed below are accurate reflections of the results of Google searches performed before September 15, 2008 and September 15, 2009, respectively, which showed that Trevarthen was not publicly accessible via Google using Petitioners’ keywords before those dates.

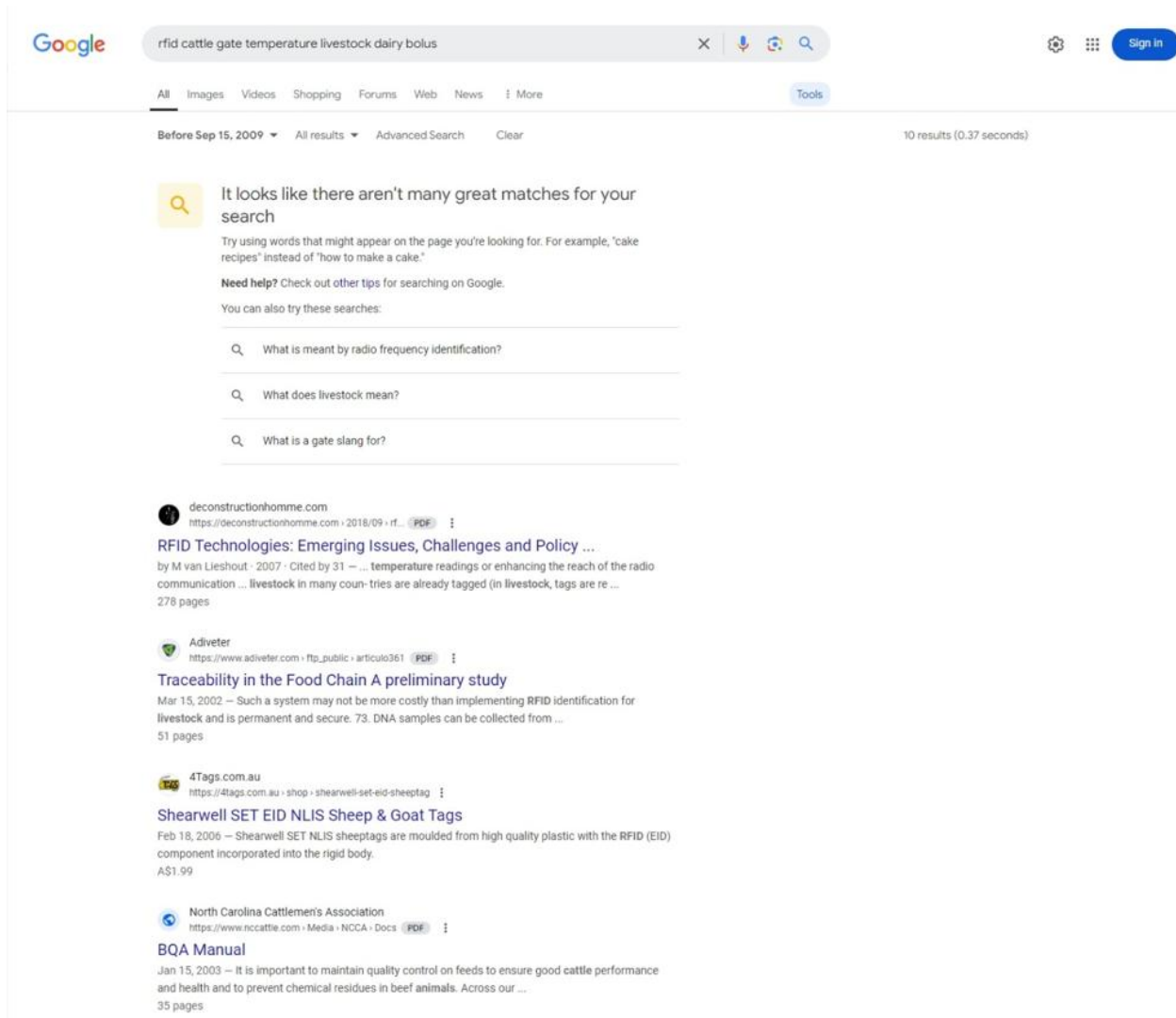
89. In short, Google’s date-limited search feature is a common, reliable, and accurate way to assess whether a document was publicly accessible via Google using keyword searches before a specific date. I have years of experience performing such assessments in my work, and I am highly qualified to perform them. As explained below, I performed an assessment of the public accessibility of Trevarthen on Google based on Petitioners’ search terms using Google’s date-limited search feature. That assessment included a reliable and accurate depiction of results that would have been returned by Google before September 15, 2008 and September 15, 2009, respectively. As discussed more below, Petitioners have not provided enough evidence to show that Trevarthen was publicly accessible before September 15, 2008, or before September 15, 2009.

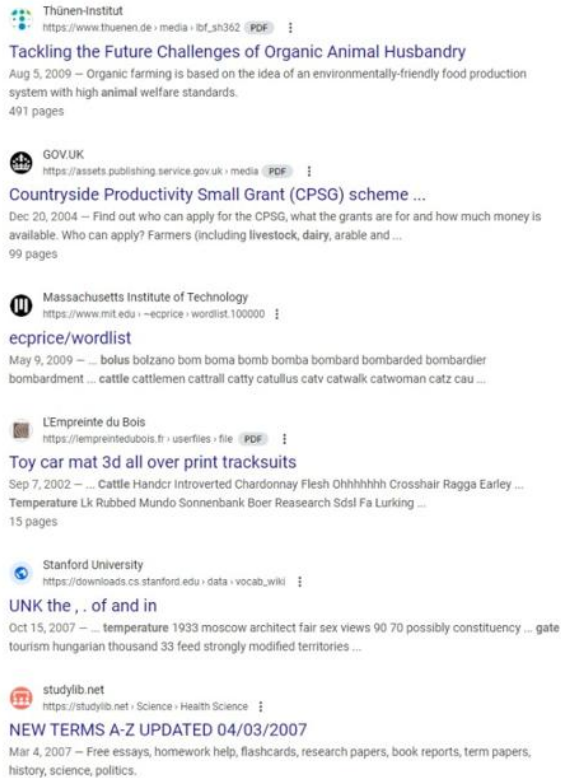
B. Trevarthen Was Not Available by Keyword Searching Internet Search Engines

90. In a prior declaration, I personally attempted to recreate the search that Petitioners suggest would have been conducted by a POSA on or before September 15, 2008 or September 15, 2009, and, in doing so, I was unable to locate Trevarthen. Ex. 2001 ¶¶ 59–88. In incorporate that analysis by reference here.

91. For this declaration, I again personally attempted to recreate the search that Petitioners suggest would have been conducted by a POSA on or before September 15, 2009 or September 15, 2008, and, in doing so, I was unable to locate Trevarthen. Specifically, Dr. Brown-Brandl states that “the POSA prior to September 2008 searching for literature regarding livestock management sensor systems on internet search engines would have used terms such as ‘rfid,’ ‘cattle,’ ‘gate,’ ‘temperature,’ ‘livestock,’ ‘dairy,’ ‘bolus.’ These terms appear in many places throughout Trevarthen, so based on my experience it likely the POSA would have located Trevarthen using such terms, or similar search terms.” Ex. 1003 ¶ 69. Notably, I see no evidence that Dr. Brown-Brandl or anyone else actually performed any test to support Dr. Brown-Brandl’s hypothesis that finding Trevarthen was “likely” based on inputting her search terms in a search engine. As explained below, I tested Dr. Brown-Brandl’s hypothesis using her search terms and Google’s search engine and determined that Trevarthen would not have been locatable.

92. To test Dr. Brown-Brandl's hypothesis, I input her search terms into Google's search engine and limited the search to "before Sep 15, 2009" as shown below in the screenshots that I captured from my computer:





As shown, Dr. Brown-Brandl’s search terms returned one page of results in Google’s search engine, none of which are Trevvarthen.

93. I performed the same test except with the date changed to “before Sep 15, **2008**” and again Trevvarthen was not included in Google’s search results, as shown below:

Google

rfid cattle gate temperature livestock dairy bolus

All

Images

Videos

Shopping

Web

Forums

News

More

Tools

Before Sep 15, 2008

All results

Advanced Search

Clear

About 7 results (0.21 seconds)

It looks like there aren't many great matches for your search

Try using words that might appear on the page you're looking for. For example, "cake recipes" instead of "how to make a cake."

Need help? Check out other tips for searching on Google.

You can also try these searches:

How to check walkie talkie frequency?

What does livestock mean?

What is the definition of a gate?

North Carolina Cattlemen's Association

https://www.nccattle.com | PDF |

BQA Manual

Jan 15, 2003 — The program, now entitled North Carolina - Beef Quality Assurance (NC-BQA), is a cooperative effort between beef producers, veterinarians, nutritionists,...

35 pages

Adveter

https://www.adveter.com | PDF |

Traceability in the Food Chain A preliminary study

Mar 15, 2002 — Such a system may not be more costly than implementing RFID identification for livestock and is permanent and secure. 73 DNA samples can be collected from ...

51 pages

4Tags.com.au

https://4tags.com.au |

NSW & ACT NLIS Tags

Jul 1, 2004 — NLIS cattle was introduced in NSW on 1 July 2004 and involves electronic identification of cattle and recording of all cattle movements in the NLIS database.

GOV.UK

https://assets.publishing.service.gov.uk | PDF |

Countryside Productivity Small Grant (CPSG) scheme ...

Dec 20, 2004 — Find out who can apply for the CPSG, what the grants are for and how much money is available. Who can apply? Farmers (including livestock, dairy, arable and ...

99 pages

4Tags.com.au

https://4tags.com.au |

Victoria NLIS Tags

Jul 1, 2004 — Electronic NLIS (sheep) tags of any colour and NLIS cattle tags should be purchased directly from the Agriculture Victoria here.

L'Empreinte du Bois

https://lempreintedubois.fr | PDF |

Toy car mat 3d all over print tracksuits

Sep 7, 2002 — ... cattle Handcr Introverted Chardonnay Flesh Ohhhhhhh Crosshair Ragga Earley ... Temperature Lk Rubbed Mundo Sonnenbank Boer Reasearch Sdsi Fa Lurking ...

Stanford University

https://downloads.cs.stanford.edu |

UNK the , . of and in

Oct 15, 2007 — ... temperature 1933 moscow architect fair sex views 90 70 possibly constituency ... gate tourism hungarian thousand 33 feed strongly modified territories ...

Sponsored

Vanch

https://www.vanch.net |

UHF RFID Animal Track Handheld

Cattle RFID — We are UHF RFID products and system solution provider, UHF RFID Reader Manufacturer-VANCH. Focusing on the research and development of warehouse...
uhf rfid reader module · rfid bluetooth reader · Rfd solution · UHF RFID reader supplier

Contact us - sales@vanch.net

Sponsored

Merck Animal Health USA

https://www.merck-animal-health-usa.com |

RFID Herd Monitoring Tags

Dairy Cow Activity Monitors — Advanced Dairy Cow Monitoring Solutions for Optimal Productivity and Efficient Management. SenseHub® Dairy Elevates the Unmatched Technology and Service from SCR Dairy and Allflex. Increase Labor Efficiency. Simply Tasks. Over 1M Cows Monitored.
About SenseHub Dairy · Cow Location Reimagined · Improved Reproduction

● Stillwater, Oklahoma - Based on your past activity - Update location

49

ST Reproductive Technologies, LLC EX2009
Smactec, Inc. v. ST Reproductive Technologies, LLC; No. IPR2024-00885
Page 53 of 144

94. Neither Dr. Brown-Brandl nor Petitioners provide any suggestions on whether or how a POSA might combine the various search terms offered by Dr. Brown-Brandl. However, as a further test, I added an “OR” connector between each of Dr. Brown-Brandl’s terms to determine whether that would turn up Trevvarthen, and it did not. As shown below, a search that includes any of Dr. Brown-Brandl’s terms returned 157,000,000 results before September 15, 2009:

Google

rfid OR cattle OR gate OR temperature OR livestock OR dairy OR bolus

Sign in

All Images Videos Shopping Forums News Web More

Tools

Before Sep 15, 2009 All results Advanced Search Clear

About 157,000,000 results (0.36 seconds)

Michigan State University
https://www.carr.msu.edu/uploads/radio_frequ... PDF

Radio Frequency Identification (RFID) Technology for Cattle
by RE Tag · Cited by 2 — Radio frequency identification (RFID) describes a system that wirelessly transmits the identity of an object, in the form of.
2 pages

The Beef Site
https://www.thebeefsite.com/articles/radio-frequenc...

Radio Frequency Identification for Beef Cattle
Jun 29, 2006 — Individual identification of cattle can be accomplished using various techniques such as ear tags, freeze brands, or tattoos.

Allflex Livestock Intelligence Global
https://www.allflex.global

Livestock Identification Services with 65 Years of Experience
Apr 26, 2008 — Discover livestock ID services that can help you manage livestock information more efficiently, backed by best-in-class technical support.

atlasRFIDstore
https://www.atlasrfidstore.com

RFID Products & Solutions | Buy RFID Readers, Tags ...
Jul 17, 2008 — Browse RFID products and solutions below or simply reach out to us for a FREE consultation on which products are best suited for your application.

ScienceDirect.com
https://www.sciencedirect.com/science/article/pii/

Comparison of Reticular and Rectal Core Body ...
by JM Bewley · 2008 · Cited by 148 — The biologically inert bolus resides in the cow's reticulum and is queried each time the cow passes the reader. Reticular temperature (RETT) and rectal ...

Ear Tag Central
https://www.eartagcentral.com/...

840 EID (RFID) Tags
Sep 1, 2008 — The Y-TEX RFID tag is ISO 11784 compliant employing full duplex and half duplex technology. The transponder is encapsulated in a weather-resistant polyurethane ...
\$2 to \$6

Dairy Queen
https://www.dairyqueen.com/en-us

Dairy Queen®: Burgers, Blizzard® Treats & More. Happy ...
Sep 7, 2007 — Discover Dairy Queen® special promotions, seasonal Blizzard® favorites, and more. Find out why Happy Tastes Good® at a DQ® near you today.
[Gift Cards & Gear](#) [Non-Dairy Dilly® Bar](#) [Menu](#) [Locations](#)

WX Maps
http://wxmaps.org/pix/temp4

10-Day Temperature Outlook
Mar 15, 2006 — Temperature Outlook for Europe. Related Maps: Climate outlook for Precipitation and Soil Moisture.

OpenStreetMap Wiki
https://wiki.openstreetmap.org/wiki/Tag:barrier=gate

Tag:barrier=gate
Mar 2, 2009 — A gate is a section in a wall or fence which can be opened to allow or restrict access. They are usually made of wood or metal.

The Humane Society of the United States
https://www.humanesociety.org/resources/livestock-d...

Livestock disaster preparedness
Jan 31, 2002 — Contact your state department of agriculture and county extension service well in advance of a disaster to learn how they can help in the event of an evacuation ...

Go

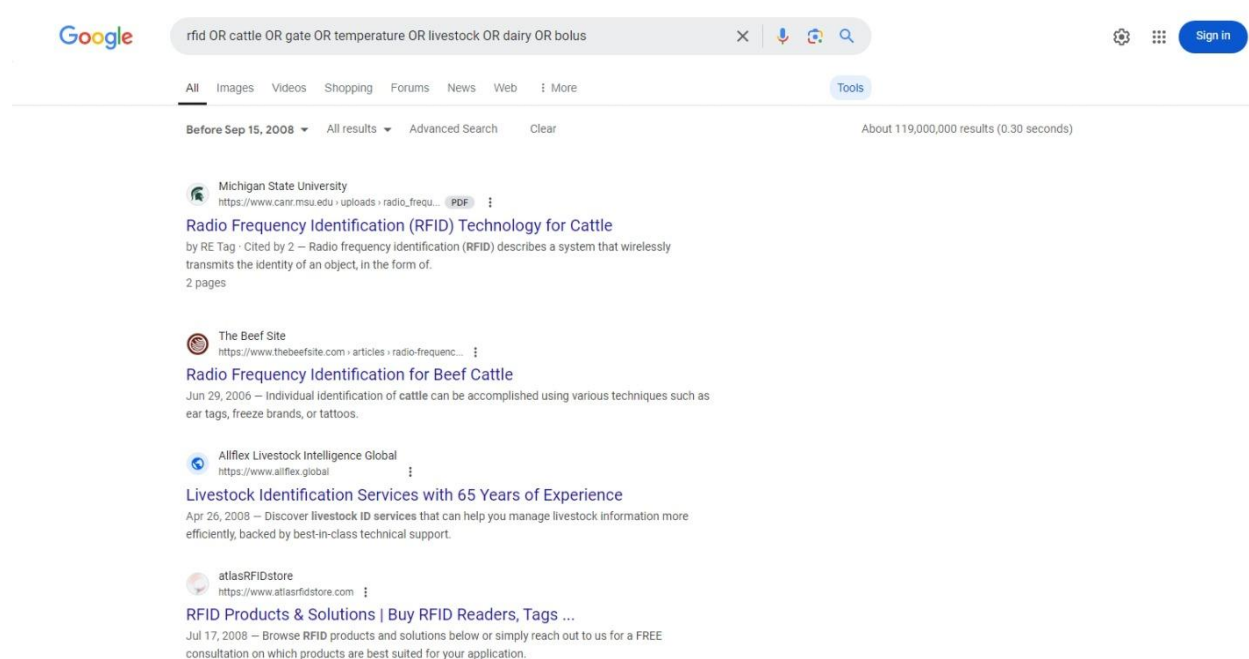
1 2 3 4 5 6 7 8 9 10 Next

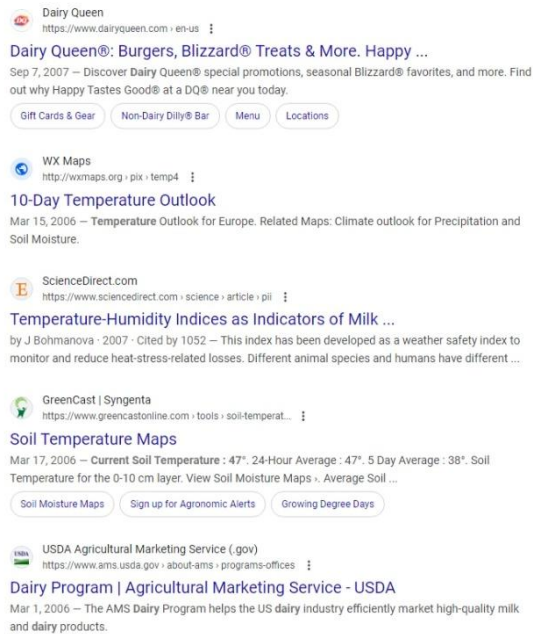
● Stillwater, Oklahoma - From your IP address - Update location

[Help](#) [Send feedback](#) [Privacy](#) [Terms](#)

It would be impossible and unreasonable for a POSA or other interested person to review 157,000,000 results. However, I reviewed the first 25 pages of Google's results and did not see Trevarthen. Therefore, even an expanded search that includes any of Dr. Brown-Brandl's search terms did not reasonably uncover Trevarthen.

95. I performed the same test except with the date changed to “before Sep 15, 2008,” as indicated in the screenshot below:



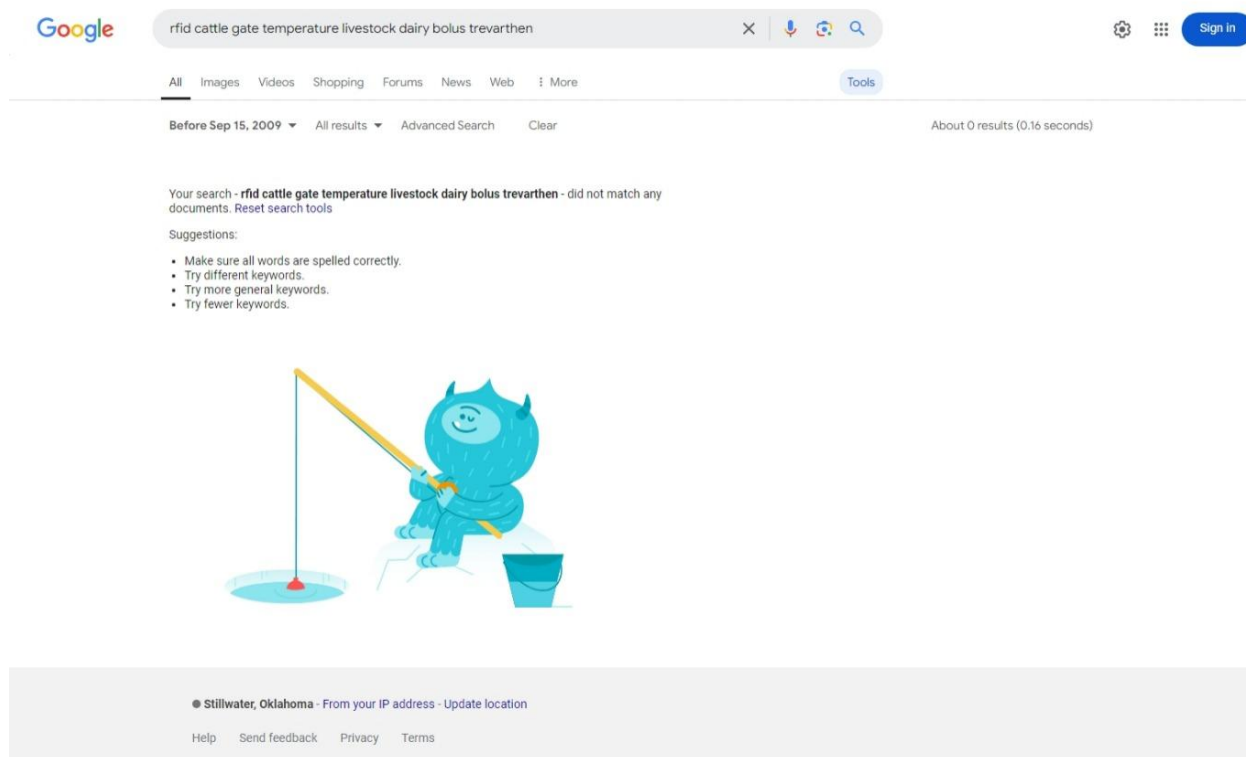


● Stillwater, Oklahoma - From your IP address - Update location

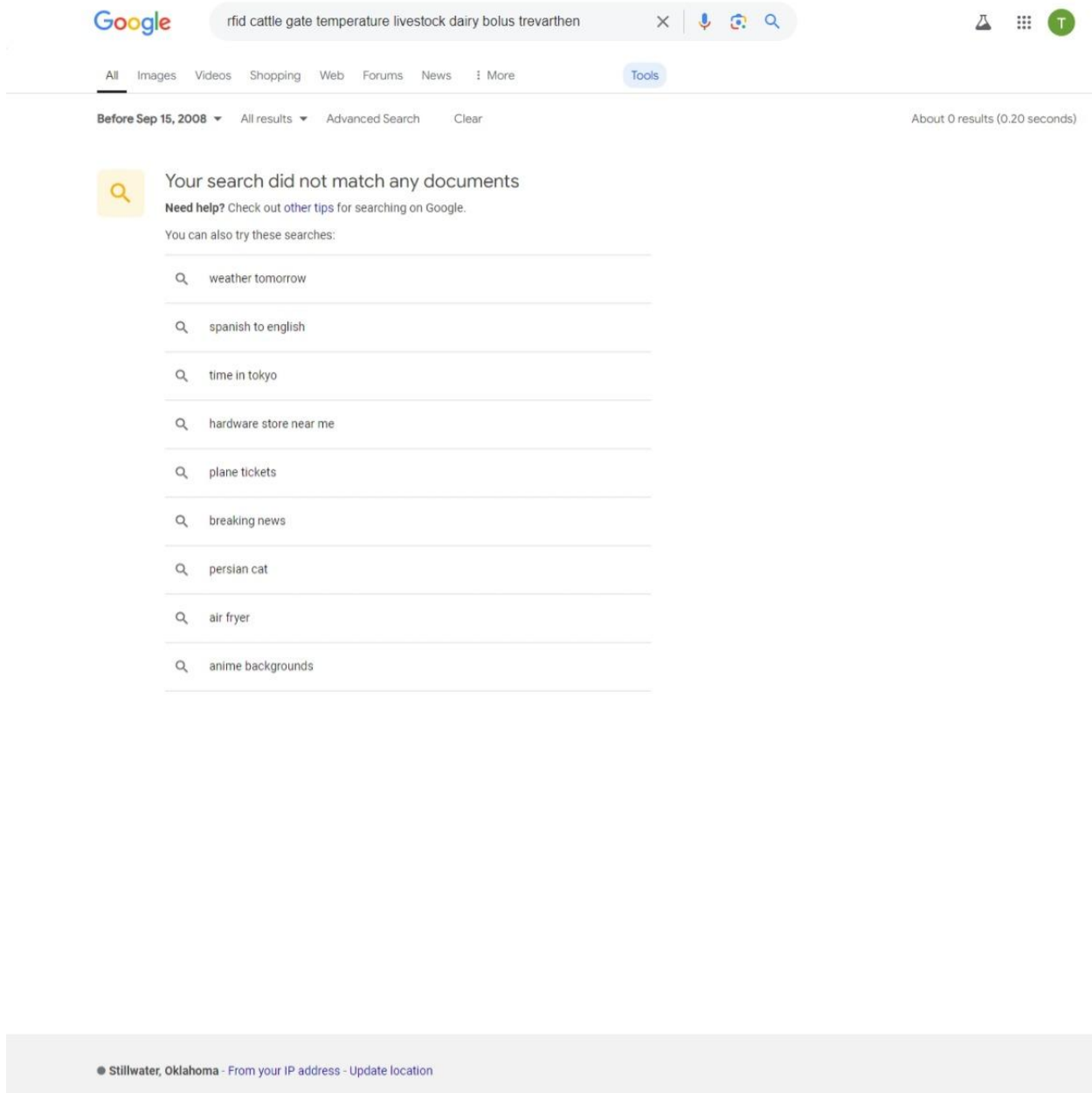
[Help](#) [Send feedback](#) [Privacy](#) [Terms](#)

As shown, the pre-September 15, 2008 search returned 119,000,000 results. And, again, Trevarthen was not included in Google’s search results on the first 25 pages.

96. To determine whether Trevarthen was locatable on Google at all, I conducted another search where I added “trevarthen” to Dr. Brown-Brandl’s search term list “before September 15, 2009,” which again did not find Trevarthen:

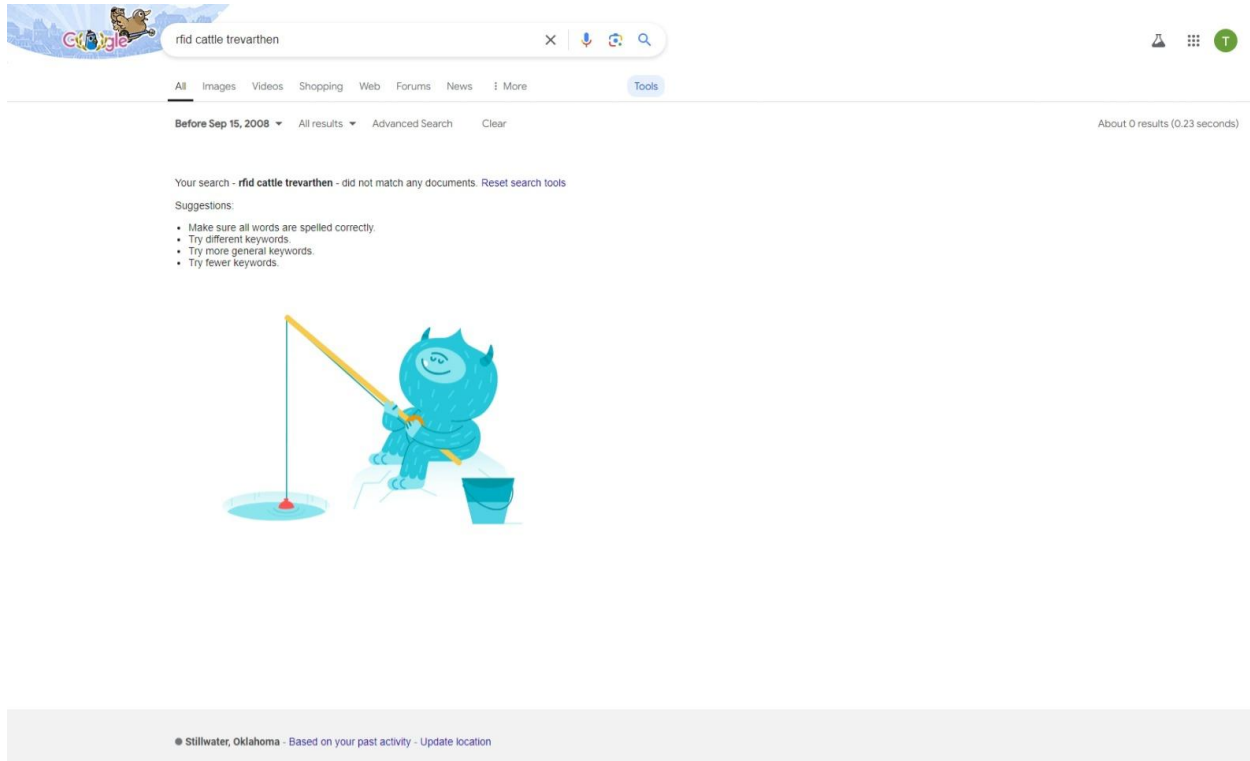


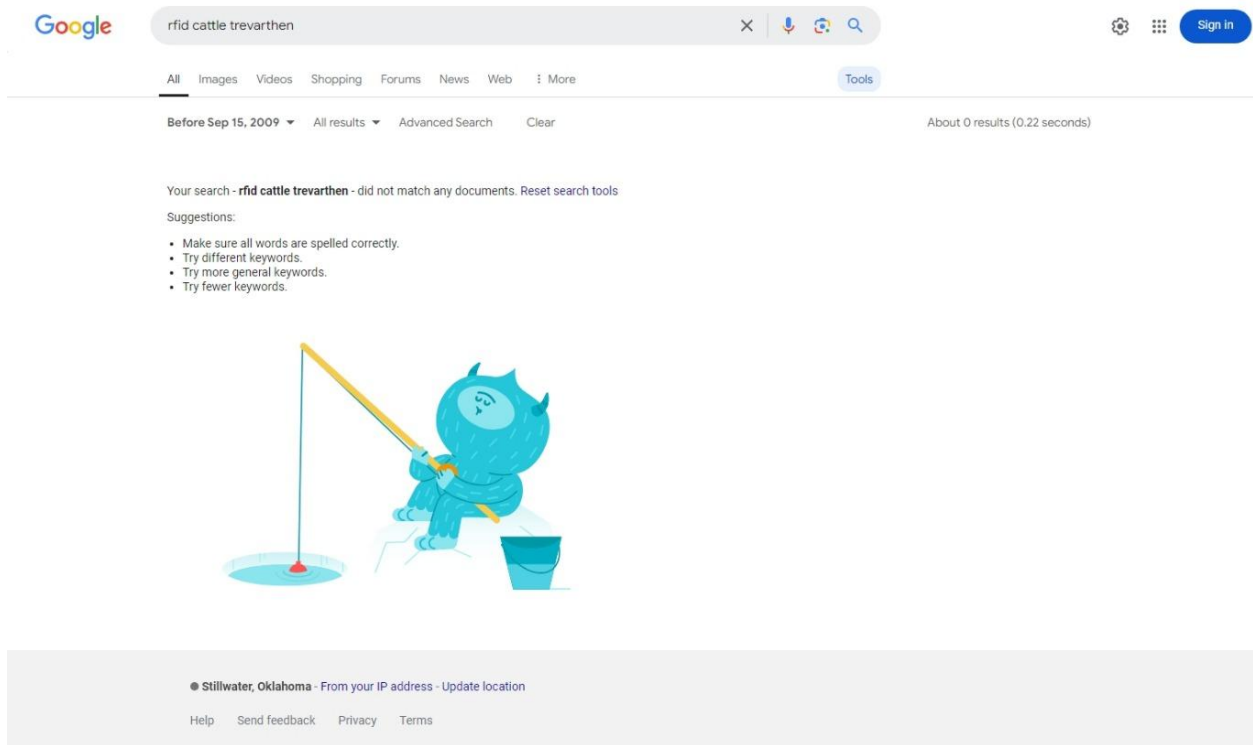
97. I obtained the same result when I changed the date to “before September 15, **2008**,” as shown below:



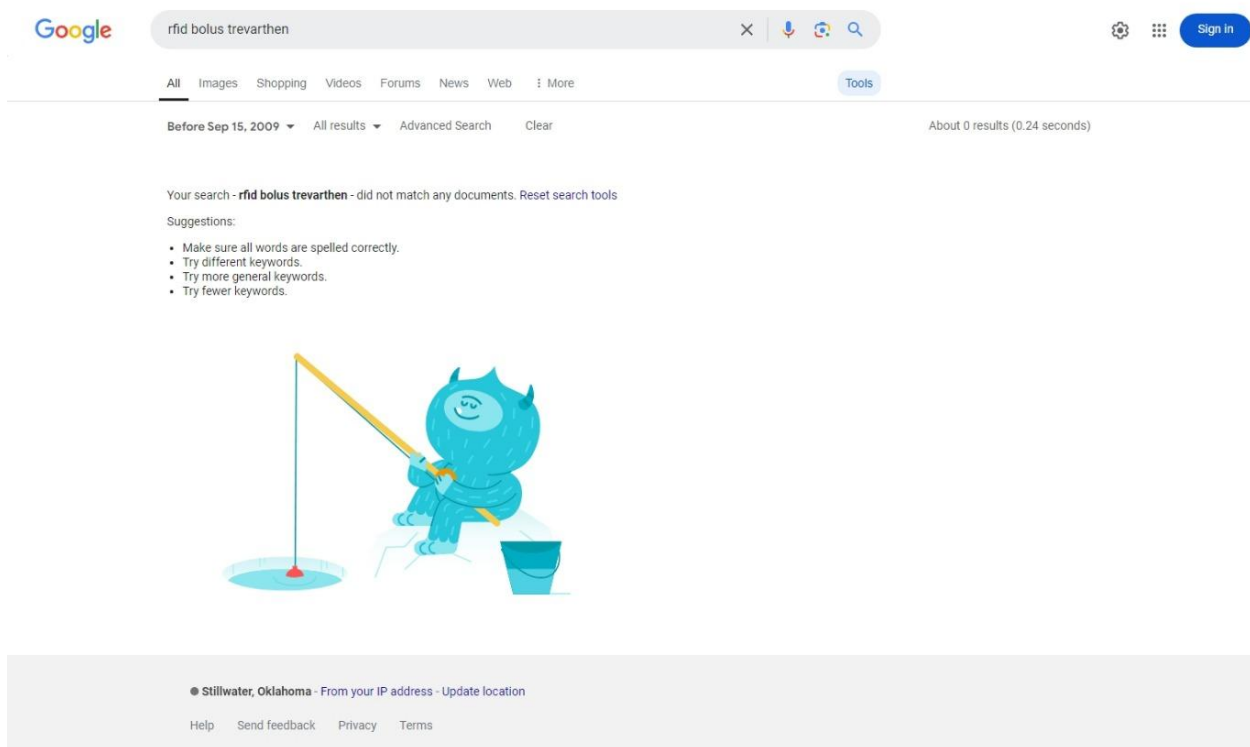
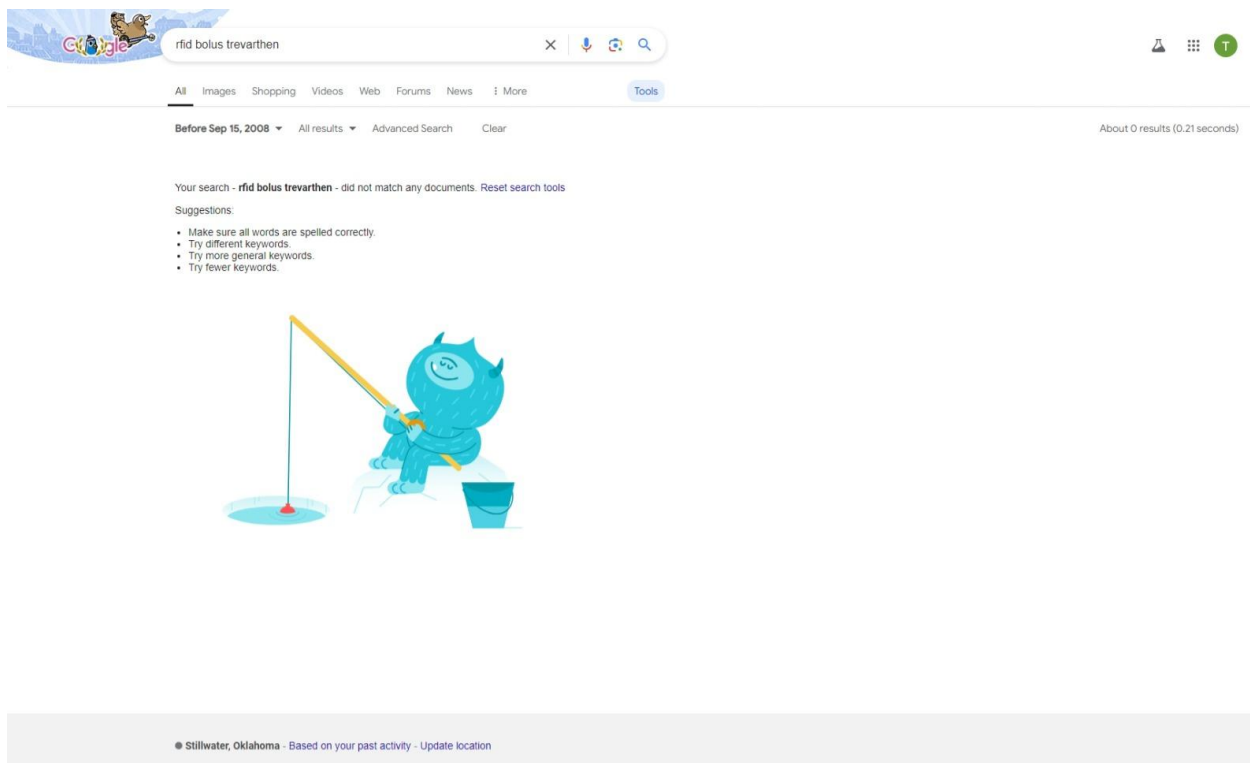
98. I also tested Dr. Brown-Brandl’s theory by choosing what I believe are the most relevant terms from her suggested list (RFID, cattle, and/or bolus) and adding them to “Trevarthen” to see if Trevarthen would turn up at all. Once again, Trevarthen did not turn up.

99. First, I searched for “rfid cattle Trevarthen,” and nothing turned up:



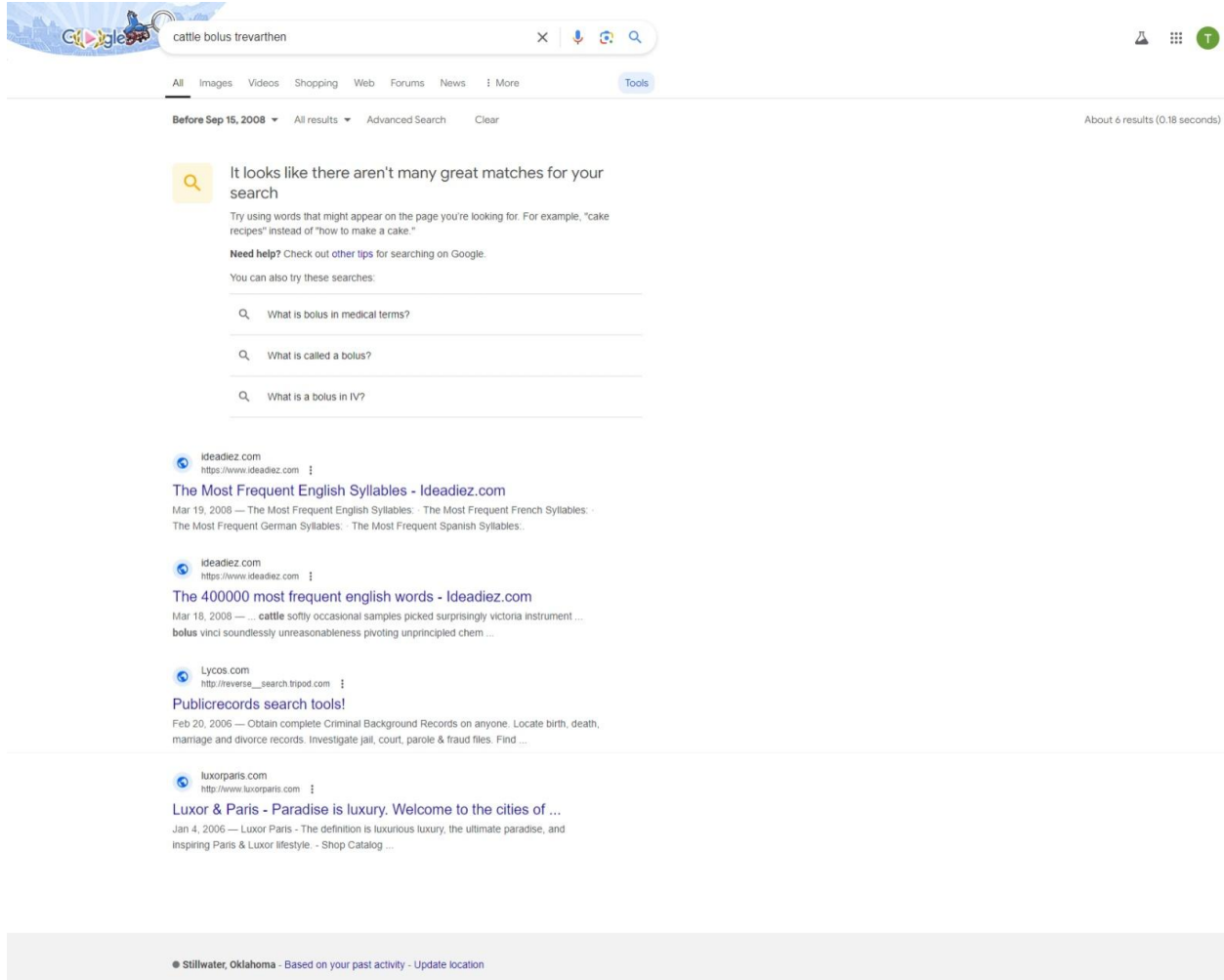


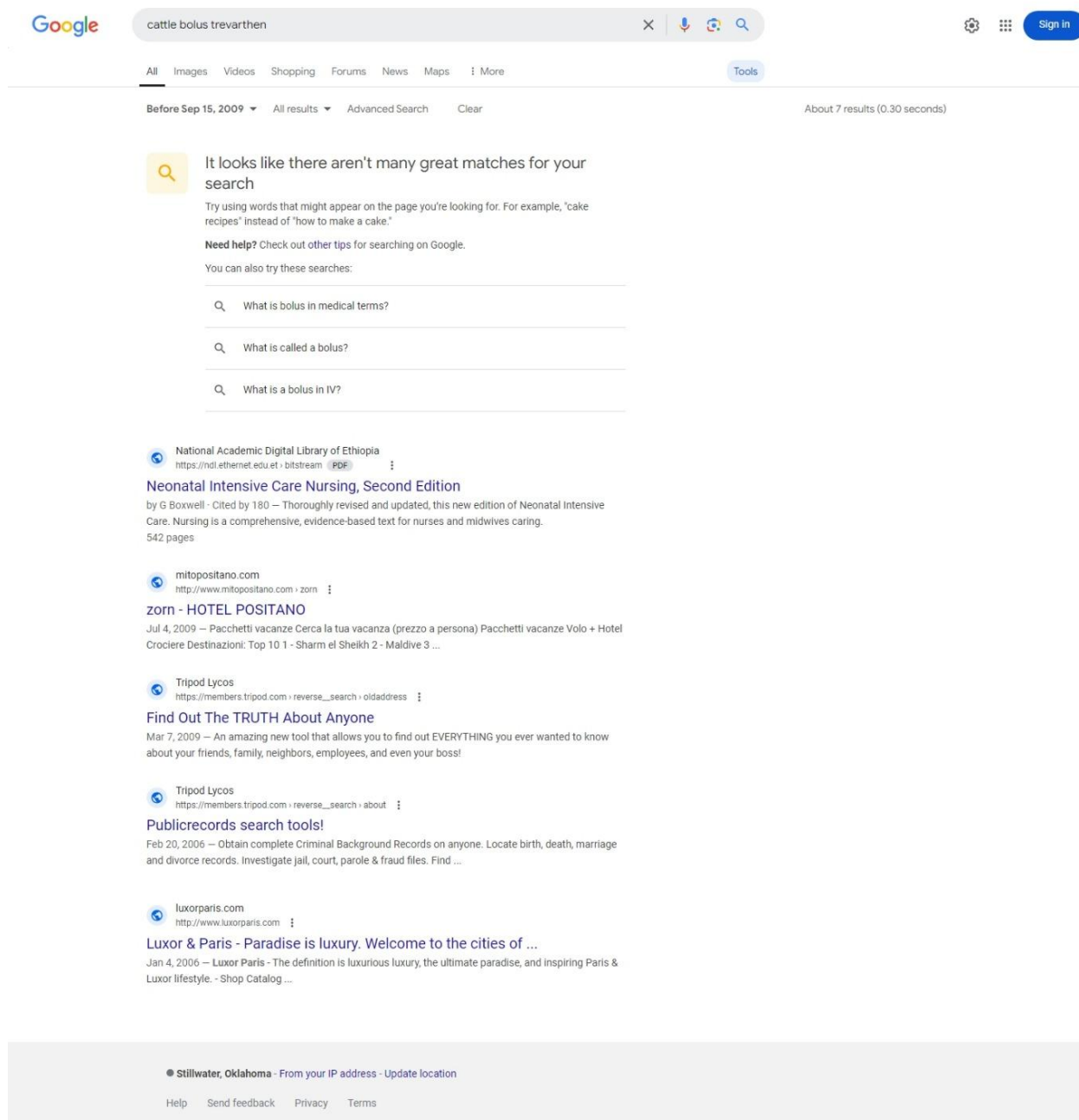
100. Second, I searched for “rfid bolus Trevarthen” and nothing turned up:



101. Third, I searched for “cattle bolus Trevarthen” and Petitioners’

Trevarthen reference did not turn up:





102. Finally, I searched each of Dr. Brown-Brandl’s proposed terms individually “before September 15, 2009,” and found that they returned the following number of results:

- rfid: 1,450,000

- cattle: 12,800,000
- gate: 74,500,000
- temperature: 102,000,000
- livestock: 390,000
- dairy: 10,900,000
- bolus: 73,900

Again, it would be impossible and unreasonable for a POSA or other interested person to review every result for each term. However, I reviewed the first 25 pages for each term (unless there were less than 25, in which case I reviewed every page). In doing so, I did not see Trevarthen. Therefore, a search that includes any one of Dr. Brown-Brandl's search terms did not reasonably uncover Trevarthen.

103. Petitioners and Dr. Brown-Brandl further state that “Google and Google Scholar” increase the “visibility” of publications, though it is unclear if they are suggesting that Trevarthen was available on Google Scholar. Pet. at 8; Ex. 1003 ¶¶ 27, 68–69. I have seen no evidence that Trevarthen was uploaded to or available on Google Scholar before September 15, 2009 or September 15, 2008.

104. Based on the above, I see no grounds to conclude that Trevarthen was reasonably discoverable or would have likely been discovered using a search engine or Google Scholar.

105. In summary, based on my review of Petitioners' evidence and the searches suggested by Petitioners and their expert, I do not believe Petitioners have provided enough evidence to show that Trevarthen was publicly accessible before September 15, 2009 (or before September 15, 2008).

106. Below I provide additional opinions and observations regarding the specific evidence that Petitioners provide.

C. The Munford Declaration

107. Petitioners submit a declaration from June Munford. Ex. 1031. I understand Ms. Munford has a degree in Library and Information Science from the University of Wisconsin-Milwaukee. *See* Pet. at 7–9; Ex. 1031 at 3. I have reviewed Ms. Munford's declaration. I do not see any evidence that Ms. Munford has personal experience with the University of Wollongong's Research Online tool that Petitioners say was publicly accessible. *See, e.g.,* Ex. 1031 at 24–25. I also do not see any evidence that Ms. Munford is a POSA or has expertise regarding whether or not a member of the relevant public, such as a POSA, would look to the University of Wollongong or its Research Online for a document such as Trevarthen. Notably, Ms. Munford seems to rely on a 2009 article to explain how the Research Online tool functions. *See* Ex. 1031 at 6 (citing Ex. 1027). However, in my opinion, understanding or knowing how Research Online functioned in 2009 does not suggest or show that a POSA would have had any reason to use Research Online to find a

document in the relevant field, such as Trevarthen. The Munford Declaration, and the other evidence provided by Petitioners, does not explain *how* a POSA would have located Trevarthen using Research Online. In fact, the Petition never explains any searching functionality or indexing available on Research Online during the relevant period.

108. It is also noteworthy that the University of Wollongong was not known by POSAs for producing relevant work in the field of herd management, and the Research Online tool is limited to only those reports and theses affiliated with the University of Wollongong. This is consistent with Mr. Trevarthen himself seeking a “Bachelor of Information and Communication Technology,” not an agricultural or dairy-related degree. Trevarthen at Cover (exhibit page 3 of 169); *see also id.* at Publication Details (exhibit page 2 of 169). Similarly, his thesis advisor was Dr. Katina Michael, who was in the “Faculty of Informatics,” not an agricultural or dairy-related department. *Id.* at Publication Details (exhibit page 2 of 169).

109. Ms. Munford makes a statement that interested persons would have located Trevarthen on a search engine “by entering terms found in the full text of Trevarthen.” *See* Ex. 1031 at 10. This does not make sense to me, as it would require that the interested person knows the text of Trevarthen *before* locating it, which is not reasonable. Moreover, as I have shown above, Petitioners’ suggested search failed to return Trevarthen.

110. The Munford Declaration also states that Trevarthen was downloaded hundreds of times. Ex. 1031 ¶¶ 21–26. However, I see no evidence that such downloads were made by POSAs or the interested public before September 15, 2008. For example, downloads could have been initiated by individuals who were aware of his work, such as the author, his student colleagues, his friends and family, his faculty advisors, or persons interested in other aspects of Trevarthen’s work, like his review of literature, and farmers and workers he interviewed. In my work, I maintain files of my publications on my work computer, making it convenient to upload the files and send copies to colleagues and clients. However, I frequently download and resend those files to colleagues and clients when I am away from my office computer. In my experience, students, and their peers, may download their papers multiple times for similar reasons.

D. The Wayback Machine Archives

111. Petitioners submit an affidavit from Nathaniel E. Frank-White. Ex. 1030 (“the White Affidavit”). I understand that Mr. Frank-White is a Records Request Processor at “the Internet Archive.” After reviewing the White Affidavit, I do not believe it can establish public accessibility of Trevarthen.

112. The White Affidavit states that Trevarthen was available based on archived webpages of Research Online from at least September 7 and 12, 2007, and March 22, 2008. Ex. 1030 at Ex. A. Mr. White further states that he located these

archives by searching the “URL” for the Research Online copy of Trevarthen on the Wayback Machine. Ex. 1030 at 1. Notably, however, Mr. White does not explain how a POSA would have obtained the URL in the first place. And, in my opinion, a POSA would not have had any means of reasonably obtaining the Trevarthen URL. In other words, a person interested in the field of the ’515 Patent would not have been independently aware of the web address for Trevarthen on Research Online. In addition, the Research Online tool is described as “...an open access digital archive, or institutional repository, promoting the scholarly output of the University of Wollongong.” Ex. 1030 at Ex. A.

E. The International Search Report

113. Petitioners also rely on a citation to an International Search Report for a New Zealand-based international patent application, which “identified Trevarthen as reference D1.” Pet. at 9 (citing Exs. 1028 and 1029). I understand that the International Search Report was conducted by the Australian Patent Office regarding a New Zealand applicant. *See* Exs. 1028 and 1029. Based on my review of Exhibits 1028 and 1029, I do not agree that those documents “corroborate” that Trevarthen was publicly accessible. As discussed above, I have not seen evidence that Trevarthen was publicly accessible, and these additional exhibits could not “corroborate” that Trevarthen was publicly accessible. Moreover, as discussed

below, Exhibits 1028 and 1029 do not independently show that Trevarthen was publicly accessible.

114. Exhibit 1028 is an “International Search Report” conducted by “P. Thong” of the Australian Patent Office. Ex. 1028 at 1. The document lists “electronic data bases” that were used, and “where practicable, search terms used.” Those data bases include “DWPI,” “internet,” “AusPat,” “Patent Lens,” “PCT Gazette,” “Esp@cenet,” and “GetThePatent.” The “search terms used” includes “cattle, rfid, gate, etc.” Neither Dr. Brown-Brandl nor Petitioners list any of these resources as a place where an interested person or POSA would search for relevant literature, except to the extent the “internet” includes search engines such as Google. In my opinion, a POSA or interested person would not look for literature using “DWPI,” “AusPat,” “Patent Lens,” “PCT Gazette,” “Esp@cenet,” or “GetThePatent.” In fact, I attempted to access each of these and, when the resource was accessible, I was not able to find Trevarthen using Dr. Brown-Brandl’s or the Australian Patent Office’s keywords. For example, “AusPat” I understand is <https://inspire.wipo.int/auspat>. I was unable to use any of the tools available to locate Trevarthen (or any other non-patent literature). Moreover, DWPI I understand to be “Derwent World Patent Index” (see <https://clarivate.com/products/ip-intelligence/ip-data-and-apis/derwent-world-patents-index/>), which was not accessible apparently without a subscription.

Therefore, a POSA or interested person would not have used it at all. I was unable to locate Trevarthen using any of the other resources, either.

115. I note that “cattle, rfid, gate” (the search terms indicated to be used by the Australian Patent Office) were included in Dr. Brown-Brandl’s suggested search terms. As I determined above, those search terms would not uncover Trevarthen in a reasonable search of Google. Therefore, it is highly unlikely that the examiner’s searches using such terms on the “internet” would have uncovered Trevarthen.

116. I further note that Ex. 1028 provides a full URL for Trevarthen: “<<http://ro.uow.edu.au/cgi/viewcontent.cgi?article=1000&context=thesesinfo>>.” Given that Exhibits 1028 and 1029 do not provide specific details on exactly how Trevarthen was located, and that I was unable to locate Trevarthen using Petitioners’ or the Australian Patent Office’s keywords or databases, it is entirely possible and reasonable to conclude that the examiner at the Australian Patent Office was provided with a URL address from an Australian University.

IX. GROUND 1 – ANTICIPATION OR OBVIOUSNESS OF CLAIMS 1–2 BASED ON TREVARTHEN

117. As discussed above, Trevarthen cannot anticipate or render obvious claims 1 or 2 of the ’515 Patent because Petitioners have not shown that Trevarthen is publicly accessible. *See* Section VIII. Below I provide additional reasons why I disagree with Petitioners and Dr. Brown-Brandl that Trevarthen anticipates or renders obvious the Challenged Claims of the ’515 Patent.

A. Combinations of Separate Disclosures in Trevarthen

118. In Ground 1, Petitioners and Dr. Brown-Brandl pick and choose from aspects of unrelated discussions in Trevarthen involving distinct systems. For example, they cite to Trevarthen's background section regarding a "Literature Review," its study of the "Cochrane Dairy," and various aspects of a proposed "theoretical framework" through their discussions of the various claim elements.

119. For example, for claim element 1[A], Petitioners rely on "computer screens," "RFID reader," and a "software application" used at Cochrane Dairy. Ex. 1003 ¶ 97; Pet., 12 (citing Trevarthen, 78–79). Cochrane Dairy is discussed in Trevarthen Chapter 5, which spans Trevarthen pages 69–98. For other elements, Petitioners and Dr. Brown-Brandl rely on discussions from different chapters in Trevarthen that describe systems (or hypothetical systems) that are distinct from Cochrane Dairy.

120. For the "RFID device implanted in an animal" in element 1[B], Dr. Brown-Brandl relies on various chapters, including Trevarthen's background "Literature Review" where he discusses an unspecified "bolus" and an "RFID microchip." *See* Ex. 1003 at ¶¶ 99 (citing Ex. 1005 at 20, 22, 24–25, 99–100, 121 for discussions of boluses and microchips). The bolus and microchip are discussed in discrete sections of Trevarthen that are unrelated to his discussion of the Cochrane Dairy system that Dr. Brown-Brandl relies on for element 1[A]. Ex. 1005 at 69–98

(“Chapter 5 – Advanced Case Study: The Cochrane Dairy”); *id.* at 20, 22 (referring to bolus in “2.5 Australia’s Traceability System” as part of “Chapter 2 – Literature Review”), 24-25 (referring to microchip in “2.7 RFID Temperature Sensing (Bio-thermo RFID)” as part of “Chapter 2 – Literature Review”), 99-100 (referring to bolus in section of “Chapter 6 – Towards Total Farm Management”), 121 (referring to microchip in section of “Chapter 6 – Towards Total Farm Management”). She does not explain why a POSA would envision those components in conjunction with the Cochrane Dairy software discussed for claim element 1[A].

121. In Dr. Brown-Brandl’s discussion of claim element 1[C], she relies on a discussion of “RFID readers” used for “identifying every cow with RFID tags,” which is part of one of Trevarthen’s theoretical systems. Ex. 1003 at ¶¶ 101-102 (citing Ex. 1005 at 102, 103, and 106, which are part of “Chapter 6 – Toward Farm Management”). She also relies on Trevarthen’s statement, “In order to derive any use and subsequent benefit from the practice of identifying every cow with RFID tags, a farm requires an RFID reader device.” Ex. 1003 ¶ 98 (citing Ex. 1005 at 102). But that statement comes from Trevarthen’s discussion of a theoretical framework. She does not discuss whether a POSA would envision using these aspects of Trevarthen’s theoretical framework as a part of the systems she describes above for elements 1A and 1[B].

122. Dr. Brown-Brandl’s discussion of elements 1[D] through 1[G] rely on both Cochrane Dairy and an aspect of the theoretical framework from Chapter 6. *See, e.g.*, Ex. 1003 at ¶ 104 (citing Ex. 1005 at 102, 112 (Chapter 6)), ¶ 106 (citing Ex. 1005 at 80 (Cochrane Dairy)), ¶ 112 (citing Ex. 1005 at 98 (Cochrane Dairy) and 109 (Chapter 6)). She never explains how or why a POSA would incorporate aspects of the different systems into a single method arranged as in claim 1. And again she does not discuss whether these teachings from Trevarthen would be incorporated in the various systems relied on for elements 1[A], 1[B], or 1[C] discussed above.

123. Moreover, element 1[D] and 1[E] require “linking” and “converting” and “amount of animal information of said animal stored in a data base of said computer.” “Said computer” must be the computer that was connected to the RFID device reader of element 1[A]. However, when Petitioners and Dr. Brown-Brandl discuss elements 1[D] and 1[E], they are discussing the theoretical framework and not Cochrane Dairy. *See* Pet. at 14–17; Ex. 1003 ¶¶ 103–111. Any computer identified for those claim elements therefore would not be the computer of element 1[A], which the claims require.

124. I understand a reference like Trevarthen, which does not expressly spell out all the claim elements arranged or combined as in the claim, can anticipate the claim if a POSA, reading the reference, would “at once envisage” the claimed arrangement or combination. I therefore analyzed the Trevarthen reference with this

in mind. First of all, a POSA would understand Trevarthen's boluses, microchips, and computers at Cochrane Dairy, and milk meter systems that Dr. Brown-Brandl relies on to be independent systems and components that are not used in the same animal tracking method. For example, the "computers" at the Cochrane Dairy run a specific herd management software called "Dairy 2000." *See* EX1005, 92–93). As Trevarthen explains, that software was "tailored to suit[] the data storage and herd management needs of the dairy industry." *Id.* A POSA would not understand Trevarthen to be teaching the use of the milk meter system from page 115 with that software. Trevarthen provides no basis to envision the Cochrane's software as identifying fluctuations or "alert[ing] the operators to check [a] cow." A POSA would also not envision using Trevarthen's discrete teachings of "microchips" at either the Cochrane Dairy or in a system that employs "milk meters." Cochrane Dairy only uses "ear tags" for animal identification. A POSA would have no reason to envision the use of temperature-sensing microchips in place of those ear tags. Trevarthen does not refer to a cow's temperature in its discussion of Cochrane Dairy. *See* EX1005, 69-99. Also, in Trevarthen's hypothetical system where "milk meters" are used to identify "any problems that may arise in the herd (such as illness)," a POSA would not envision using temperature-sensing microchips to identify problems with the cows. According to Trevarthen, that function is already performed by the milk meters (*see* EX1005, 115). Therefore, a POSA would not envision a

single method using both the temperature-based and milk meter-based system because the reference says that they perform the same function. For these reasons, I conclude that a POSA would not “at once envisage” the claimed arrangement based on a reading of Trevarthen.

B. Element 1[A]: “Connecting a Computer to an RFID Device Reader”

125. Dr. Brown-Brandl and Petitioners have not identified a step of “connecting a computer to an RFID device reader” in Trevarthen as part of a method arranged as claimed. They also have not explained why such a step would have been obvious.

126. First, Dr. Brown-Brandl relies on Trevarthen’s statement that “[a]s each cow passes through the RFID reader, their individual information is displayed on the two computer screens located in the dairy.” Ex. 1003 ¶ 97 (citing Trevarthen, 78-79). According to Dr. Brown-Brandl, this “indicat[es] a connection between the RFID reader and the computer, which indicates that the RFID reader is connected to a computer.” *Id.*; *see also* Pet. at 12–13. However, these statements from Trevarthen were discussing the *Cochrane Dairy* system. Cochrane Dairy is an actual farm located in Pyree, Australia and discussed in Chapter 5 of Trevarthen. Ex. 1005 at 69. Cochrane Dairy is a completely different system from the systems described in the “theoretical framework” proposed by Trevarthen and discussed in Chapter 6. POSAs would have understood that using the Cochrane Dairy system does not

include every claim element. It also would not have been obvious to a POSA to rearrange the Cochrane Dairy system, or to incorporate it into another system, in the manner claimed.

127. Accordingly, because Dr. Brown-Brandl relies on the theoretical framework in other claim elements, and Cochrane Dairy in element 1[A], without providing a reason to combine the separate teachings, she does not show that the claim would have been obvious to a POSA.

128. Moreover, for element 1[A], Petitioners and Dr. Brown-Brandl also rely on Trevarthen's discussion of "mainstream computer network devices" that may be linked to "RFID readers." Ex. 1003 ¶ 97; Pet., 12. Those discussions refer to future potential devices that a POSA would understand were not part of any method, let alone one arranged as claimed. Below is the context of that discussion:

Ideally, farmers will be utilising wireless networks in future arrangements. This will enable an array of devices, whether fixed or portable, to be linked directly to real-time data in the herd management database. Such devices include the mainstream computer network devices, such as PDAs (Personal Digital Assistants), laptops, desktop personal computers and printers, however will also provide the vital links to dairy farm devices, such as RFID readers, milking controller units, feed management units, drafting gates, and a vast array of other devices that could be configured to operate under computer control, or require access to herd information for operation.

Trevarthen, 104. A POSA would have understood that Trevarthen was describing potential “future arrangements” and devices that potentially “could be configured to operate under computer control.” They would not have understood Trevarthen to be describing a particular system or method, including those described elsewhere in Trevarthen. Dr. Brown-Brandl and Petitioners also do not explain what methods disclosed in Trevarthen could or would be modified to incorporate the “future arrangements” discussed above. And they do not explain why or how a POSA would pursue or make such a modification to achieve the entirety of the claimed method.

129. Additionally, elements 1[D] and 1[E] refer to “said computer,” which a POSA would understand indicates that the “computer” in those elements must be the same computer identified in element 1[A]. Specifically, element 1[D] requires “linking an amount of animal information of said animal stored in a data base of *said computer* to said amount of information retrieved from said RFID device implanted in said animal, said amount of animal information stored in said data base of *said computer* comprising an amount of milk production information or an amount of days milked.” Element 1[E] requires “converting said amount of animal information of said animal stored in said database of *said computer* linked to said amount of information retrieved from said RFID device implanted in said animal into one or more logical variables.” Neither Dr. Brown-Brandl nor Petitioners identify a “computer” in elements 1[D] and 1[E]. They also do not explain that the alleged

“amount of animal information of said animal stored in said database of said computer” that is “converted” or “linked” was in a database of the “computers” identified in element 1[A]. Nor could they have. Trevarthen does not indicate or suggest that the “computer screens” at Cochrane Dairy involve a computer that has a database with “an amount of milk production information or an amount of days milked.” Trevarthen also does not indicate or suggest that the future “mainstream computer network devices” include a database with “an amount of milk production information or an amount of days milked.” I do not see any arguments in Dr. Brown-Brandl’s declaration or the Petition that would explain how it would have been obvious to include the claimed information in a database in those specific components that they identified as the “computer” of element 1[A].

130. In summary, Dr. Brown-Brandl and Petitioners do not show Trevarthen discloses or renders obvious “connecting a computer to an RFID device reader” in the manner claimed. They do not acknowledge or address that the various discussions in Trevarthen are discrete teachings. And they do not provide a reason to combine those teachings to achieve the claim.

C. Element 1[B]: “Reading an RFID Device Implanted in an Animal With Said RFID Device Reader”

131. Dr. Brown-Brandl and Petitioners also do not show that Trevarthen discloses or renders obvious “reading an RFID device implanted in an animal with said RFID device reader,” as required by element 1[B], based on Trevarthen’s

references to the “Bio-thermo RFID.” *See* Ex. 1003 at ¶¶ 98–100; Pet., 13. The Bio-thermo RFID would not have been used in any of the disclosed systems in Trevarthen (or in any method that meets the claims) because, as Trevarthen explains, the “Bio-thermo RFID” is not yet applicable to livestock. Specifically, Trevarthen states “that it is possible to incorporate temperature sensing abilities into RFID microchips currently – the application of which may soon be extended the livestock industry.” Trevarthen, 121. Trevarthen further states that “RFID temperature sensing is a currently available technology, and its use in the livestock industry is currently being investigated.” *Id.*, 123. POSAs would understand this to mean that the disclosed temperature sensing device was not yet successfully incorporated into animal tracking methods at the time.

132. Dr. Brown-Brandl and Petitioners also do not show that Trevarthen discloses or renders obvious “reading an RFID device implanted in an animal with said RFID device reader,” as required by element 1[B], based on Trevarthen’s references to “boluses.” *See* Ex. 1003 at ¶¶ 98–100; Pet., 13.

133. Based on my review of the boluses discussed in Trevarthen, my opinion is that Trevarthen’s descriptions are insufficient to teach a POSA that the boluses would be incorporated into an animal tracking method arranged as claimed. For example, on page 20, Trevarthen states the following:

There are currently only two types of devices approved for use in the NLIS – a rumens bolus or ear tag utilising a low frequency RFID transponder. Both of these devices may be read while attached to the animal. No microchips (RFID devices placed under the animal’s skin) have been approved for use in the NLIS as yet.

On page 22, Trevarthen states the following:

RFID identification devices (tags or boluses) are mandatory under the NSW NLIS scheme, however other available RFID components, such as readers, are not. Use of these additional components is left to the farmer’s discretion.

...

Currently, all devices are available for purchase from Rural Lands Protection Board (RLPB) or from the farmer’s rural merchant. The cost of an NLIS approved ear tag is approximately \$3.50 per tag, while rumen boluses are slightly more expensive.

On page 99, Trevarthen states:

RFID tags, boluses or microchips form the basis of any dairy farm RFID system. The choice of what RFID device a farm utilises is specifically a matter of personal preference for the farm owners. Each of these devices provide the same functionality, reliability and accuracy, and are intended to last for the life of the cow. Further to this, each device has their own advantages and disadvantages (such as tags being cheaper, boluses being irretrievable until the time of slaughter etc.), leaving the eventual choice of device to the individual farmer to select the device type that best suits their requirements and farm. It is

important to note that for the remaining sections of this chapter, the word ‘tag’ is utilised generically, however microchips and boluses can be used to perform the same functions.

And on page 100, Trevarthen states:

There are a number of tags, boluses and microchips available from various vendors, however there are currently only three tags, and one bolus that have been approved for use with Australia’s NLIS (Meat and Livestock Australia n.d.b, p. 18).

None of these generic descriptions provide enough information or details for a POSA to conclude whether the referenced “bolus” would be suitable for an animal tracking method arranged as claimed. Accordingly, Dr. Brown-Brandl and Petitioners also do not show that Trevarthen discloses or renders obvious “reading an RFID device implanted in an animal with said RFID device reader,” as required by element 1[B], based on Trevarthen’s references to “boluses.”

X. GROUND 2 – OBVIOUSNESS OF CLAIMS 3–4 BASED ON TREVARTHEN AND BRUNE

A. Claims 3 and 4 Would Not Have Been Obvious for Reasons Given for Ground 1

134. Ground 2 challenges dependent claims 3–4, which ultimately depend from claim 1, based on Trevarthen and Brune. Based on my review of Ground 2, I conclude that it does not show obviousness for the same reasons Ground 1 does not show obviousness. First, as discussed Section VIII, Trevarthen was not shown to be prior art. Second, Dr. Brown-Brandl and Petitioners do not rely on Brune to address

any of the missing elements or other deficiencies I have identified in Ground 1. Instead, they rely on Brune only regarding “retrieving an amount of date-time information from said plurality of RFID devices implanted in said plurality of animals,” which is a further requirement of claim 3. Therefore, Ground 2 does not show that claims 3–4 are obvious.

B. Additional Reasons Why Claim 3 and 4 Would Not Have Been Obvious to a POSA

135. Claim 3 recites: “The computer implemented method of animal tracking as described in claim 2, further comprising retrieving an amount of date-time information from said plurality of RFID devices implanted in said plurality of animals.” Claim 4 depends from claim 3 and therefore includes these requirements.

136. In my opinion, Petitioners and Dr. Brown-Brandl do not show that claims 3 and 4 are obvious in Ground 2 because they do not provide a reason to combine Trevarthen and Brune to perform the step of “retrieving an amount of date-time information from said plurality of RFID devices implanted in said plurality of animals.” According to Dr. Brown-Brandl, Trevarthen “teaches having the RFID reader provide date-time information, rather than retrieving date-time information from the RFID device itself.” Ex. 1003 at ¶ 123. In other words, Trevarthen does not teach retrieving date-time information “from said plurality of RFID devices” as in the claim. Dr. Brown-Brandl relies on a combination with Brune, who she says teaches an RFID device that provides date-time information. *Id.* at ¶¶ 122, 123–125.

137. The only possible reason Dr. Brown-Brandl gives for incorporating Brune's time-stamping technique into Trevarthen's system is the "importance of obtaining date-time information and recording it in a database." Ex. 1003 at ¶ 122. However, this would not have provided a POSA with a reason to use *Brune's* technique because Trevarthen already performs time-stamping. In fact, time stamping with the reader, as in Trevarthen, would work better for his system because Trevarthen describes obtaining temperature readings at the entry to the dairy. This would potentially provide a consistent, centralized system for providing a uniform time across all cows. I note that a system with "device-based" timers is more complex and therefore more prone to failure due to issues such as battery life, timer settings, timer accuracy, and communications with the reader. Battery life on a device-based timer would diminish faster due to energizing the clock function, increased CPU activity (due to increased software steps), and longer periods of powered data transmission. Timers are generally accurate, but since device-based timers are independent across a herd of cows, they require manual or automatic processes for setup and periodic synchronization to maintain uniformity. Synchronization of a device-based timer would be accomplished by communication with a human-machine interface (e.g. laptop) and/or a centralized computing system. Synchronization is a time and energy-consuming step needed to maintain the device-based timer. The same issues do not exist for the reader-based system because the

timer function is not device-based. The reader is energized by the farm's power network, and is not subject to running out of batteries. Also, the timer function for the reader-based system is completely supported by the centralized computer system, and therefore synchronization between devices is not required. In other words, the time is uniform in the system due to relying on a centralized time. This would have led a POSA to stick with Trevarthen's reader-based system and have no reason to use Brune's technique. In summary, the technique in Trevarthen identified by Dr. Brown-Brandl, which is different from the claims, would work better for his proposed systems.

138. I disagree with Petitioners that "it would have been *obvious to try* having the RFID device time-stamp the retrieved information rather than the RFID reader." Pet., 24 (emphasis added). I understand that "obvious to try" is a specific type of obviousness that requires showing that there is a design need or market pressure to solve a problem and that there are a finite number of identified, predictable solutions. Based on my review of the asserted art and my experience, there was no "design need," "market pressure," or "problem" that would give reason for a POSA to try Brune's time-stamping method in Trevarthen. In fact, as explained above, POSAs would have considered the RFID reader-based method preferable in Trevarthen's system. There also were not a finite number of identified, predictable solutions. Petitioners and Dr. Brown-Brandl identify two means of time-stamping,

but timestamps can be generated by various other means, such as the computer software, approximation, photo gates, load cells, image analysis, manual recording, by the milk meters, POSAs would not have known how many different solutions were available.

139. Dr. Brown-Brandl also refers to “the GPS-RFID feature proposed in Trevarthen,” which she says “provides another way to retrieve time-date information from the RFID.” Ex. 1005 at 126. But that technique is explicitly *not* taught by Trevarthen, as Trevarthen explains, “[t]he precise details of GPS (Global Positioning System) operation are outside the scope of this research.” Ex. 1005 at 123. Her reference to another patent (“Bruns,” Ex. 1036) would not provide a reason to use that technique in an RFID device in Trevarthen, as the Bruns patent has nothing to do with RFID or herd management technology.

C. Additional Reasons Why Claim 4 Would Not Have Been Obvious to a POSA

140. Claim 4 recites: “The computer implemented method of animal tracking as described in claim 3, further comprising retrieving an amount of sensed animal information from said plurality of RFID devices implanted in said plurality of animals.”

1. Retrieving “Sensed Animal Information” from a Plurality of Implanted “RFID Devices” Would Not Have Been Obvious to a POSA

141. Dr. Brown-Brandl and Petitioners also do not show that claim 4 would have been disclosed or rendered obvious to a POSA. Specifically, they have not shown that Trevarthen discloses or renders obvious a step of “retrieving an amount of sensed animal information from said plurality of RFID devices implanted in said plurality of animals.” For this limitation, they rely on the “the Bio-thermo RFID” referenced in Trevarthen. Ex. 1003 at ¶ 127.

142. Trevarthen explains that retrieving “sensed” animal information from this device was not part of any animal tracking method. For example, Trevarthen states:

It is evident from the articles of Higgins (2003) and Hostetter (2003) (articles described in section 2.7), that it is possible to incorporate temperature sensing abilities into RFID microchips currently – the application of which may soon be extended to the livestock industry.”

Ex. 1005 at 121; *see also id.* at 123 (explaining that temperature sensing with RFID microchips “in the livestock industry is currently being investigated”). In other words, while temperature sensing abilities could be incorporated into RFID microchips, that practice had not been “extended to the livestock industry” as of October 2005. Ex. 1005 at 121. A POSA would understand that such application was

merely being “investigated” and not available for implementation into an animal tracking method like the one claimed. *Id.* at 123.

143. In my opinion, the under-the-skin microchips referenced in Trevarthen were not commercially available or available to be used in any animal tracking method at the time of the invention. Trevarthen makes this clear. On page 20, Trevarthen states the following under a section titled “2.5.2 Devices Utilised in the NLIS”:

There are currently only two types of devices approved for use in the NLIS – a rumen bolus or ear tag utilising a low frequency RFID transponder. Both of these devices may be read while attached to the animal. No microchips (RFID devices placed under the animal’s skin) have been approved for use in the NLIS as yet.

Ex. 1005 at 20. The fact that no microchips have been approved for use in the NLIS suggests that the under-the-skin microchips that Dr. Brown-Brandl cites for claim 4 were not suitable for livestock applications such as the one in the claims, or else the NLIS would have permitted them. It further suggests that they were not commercially available and unavailable to a POSA for incorporation into an animal tracking method like the one claimed.

144. On page 22, Trevarthen states the following under a section titled “2.5.4.3 Pricing & How to Purchase the Devices”:

Currently, all devices are available for purchase from Rural Lands Protection Board (RLPB) or from the farmer's rural merchant. The cost of an NLIS approved ear tag is approximately \$3.50 per tag, while rumen boluses are slightly more expensive. There are no price estimates available for microchips as none have been approved to date.

Ex. 1005 at 22. The fact that there are not even price estimates for microchips essentially confirms that they were not commercially available, or else there would have been estimates available. Again, the fact that they have not been approved to date suggests that the microchips were not suitable for livestock applications such as the one in the claim. This further shows that the under-the-skin microchips that Dr. Brown-Brandl cites for claim 4 were not available to a POSA for incorporation into an animal tracking method like the one claimed.

145. On page 100, Trevarthen states the following under a section titled “6.2.1.1. NLIS-Compliant RFID Tags/Boluses”:

There are a number of tags, boluses and microchips available from various vendors, however there are currently only three tags, and one bolus that have been approved for use with Australia's NLIS (Meat and Livestock Australia n.d.b, p. 18). As such, Australian farms that are required to participate in the NLIS by state law, or who wish to participate voluntarily (which is permitted), should adopt one of these NLIS recommended devices. This will ensure that they both provide themselves with RFID capability, and also comply with the relevant NLIS specifications (as required by law in some states). Microchips

cannot currently be utilised by those participants in the NLIS, as none have been approved to date.

Ex. 1005 at 100. The fact microchips could not be utilized by participants in the NLIS also confirms that they were not commercially available and that they were not suitable for livestock applications such as the one in claim 4. This further shows that the under-the-skin microchips that Dr. Brown-Brandl cites for claim 4 were not available to a POSA for incorporation into an animal tracking method like the one claimed.

146. There are good reasons why POSAs had not successfully incorporated sensed animal information obtained from RFID devices into herd management systems at the time of the invention. In the livestock context, POSAs would have believed that a microchip such as the one referenced in Trevarthen would have been likely to cause tissue damage, possible infection, discomfort, and animal welfare issues. Cattle and other livestock spend most of their lives outdoors exposed to the elements. They roll on the ground, bite and scratch their skin, rub against trees and barbed fences, walk through thorn bushes, and immerse themselves in water. Cattle and other livestock are also exposed to temperature extremes and, in my personal experience, I have seen cattle arrive at the abattoir encrusted with mud, scarred, bruised, and bloody, which POSAs believed could impact measurements with an internal device. Additionally, POSAs considered the location of the device to be

critical for reading RFID data since readers are distance dependent. In a POSA's view, depending on the size and structure of the animal, a sensor located in the same part of the body may not register uniformly from cow to cow based on a fixed receiver location, and properties and the relative location of the animal. For these reasons, POSAs at the time would not have had reason to use the microchips in Trevarthen in the manner claimed.

147. None of the references Dr. Brown-Brandl cites in paragraph 95 of her declaration change my opinion. Ex. 1003 ¶ 127 (citing “Section V.B.1,” which discusses Exs. 1008, 1014, 1015, 1016, 1017, 1020, and 1021). In fact, each of the references that she cites to support that proposition show that such devices were not common and that they were not yet useful for practical applications, such as a herd management system or the systems proposed by Trevarthen. Bewley stated that his devices “were subject to more measurement error and variation than anticipated” and that “[a]dditional research is needed to evaluate the feasibility of these technologies for identifying physiological events of interest.” Ex. 1015, 4671–72. Hicks stated that ingested sensors need to be further studied “to determine if it can be used as a measure of deep body temperature.” Ex. 1016, 434 (describing “[s]urgically implanting a sensor,” which is an “invasive and a more complicated procedure”). With respect to another cited device in a paper authored by Dr. Brown-Brandl, she concluded that “before this system can be used in a commercial livestock setting

several changes need to be made.” Ex. 1020, 13. Some of the several changes that needed to be made included developing a “method of reliably transmitting the signal to a central computer or logging device,” investigating “the FDA approval of these transmitters for uses in animal species,” and extending “the battery life of the transmitter.” *Id.* These statements all would have discouraged POSAs from using such devices and show that they were not common, commercially available, or familiar to POSAs.

148. The other references that she cites contain similar statements to the above that also would have discouraged POSAs from using such devices and show that they were not common, commercially available, or familiar to POSAs. For example, Prendiville states that “[r]adio based signalling [sic] will play an important role in future generations for remote monitoring of humans and many other species” and that “the efficiency of the bolus needs to be improved.” Ex. 1021 at 3, 11. Higgins states that his device was still subject to a “beta test” with an under-the-skin micro-chip using “10 boars.” Ex. 1017 at 63. POSAs would have understood that any device subject to beta testing with only 10 boars is not yet ready for any practical applications. These statements from each of the above references demonstrate that implanted RFID devices were not common at the time of the invention, they would not have worked in a system arranged as claimed (e.g., as the “implanted RFID de-

vice”), and POSAs would not have had a reason to modify Trevarthen to incorporate them.

149. Moreover, Dr. Brown-Brandl’s reliance on the ’515 Patent’s discussion of “BetaTHERM Sensors” does not demonstrate why the claims would have been obvious. Ex. 1003 ¶ 127. The patent discusses BetaTHERM sensors as part of the “Mode(s) for Carrying Out the Invention.” Ex. 1001 at 4:9–10, 10:53–61. The patent explains that BetaTHERM sensors could be configured within a “bolus” for sensing “physiological characteristics of an animal (40) such as temperature, pH, heart rate, blood pressure, partial pressures of dissolved gases, or the like.” *Id.* at 10:16–34. However, that description of the BetaTHERM sensors does not suggest to a POSA that the specific configuration disclosed in the patent was known before the invention. Dr. Brown-Brandl, in my opinion, was using hindsight by using the patent specification’s discussion of the invention to reconstruct the claims. I understand this is not a proper way to assess obviousness.

150. In summary, I do not see evidence that Trevarthen discloses or renders obvious a step of “retrieving an amount of sensed animal information from said plurality of RFID devices implanted in said plurality of animals.”

2. Incorporating “Milk Production” and “Sensed Animal Information” into an Animal Tracking Method Would Not Have Been Obvious to a POSA

151. In my opinion, POSAs would have understood claim 4 to require that the retrieved “sensed animal information” to be inserted into a “logical expression” as part of the same animal tracking method that incorporates “milk” information into a logical expression in claim 1. POSAs would have that understanding because the purpose of retrieving sensed information in an animal tracking method arranged as in the claim would be to incorporate that information into the logical expression to obtain a logical value.

152. Trevarthen does not disclose a method or system that incorporated both “sensed” information, such as temperature, and “milk” information. Trevarthen’s discussions of milk production and temperature-sensing devices are in separate discussions and reflect separate teachings. POSAs would not have had a reason to combine to combine those separate teachings.

(a) Separate Teachings Related to Milk Production and Temperature Sensing in Trevarthen

153. Trevarthen’s discussions of milk production are completely separate from his discussions of temperature monitoring.

154. At page 98, for example, Trevarthen is discussing the potential use of “milking meters” at Cochrane Farm. The entirety of that discussion is below:

The Cochrane's have found great benefits from their use of RFID currently, and are interested in further advancing their RFID operations in the future. However, the only advancement that they are realistically considering is the implementation of milking meters for every milking bail. Implementing these milking meters will provide the ability to record the amount of milk each cow has provided at every milking session. This is in contrast to the current practice of only gaining these figures once a month through the use of the herd recording services of Dairy Express.

Attaining milk production figures for every cow from every milking session will provide vastly more information for the farmers to utilise in their farm management decisions. This ability may facilitate enhancements to a range of other activities also, such as enabling more up-to-date figures to be utilised for the calculation of feed requirements for each cow. Further, this frequent recording of information may also serve as a means to detect problems with cows. For example, a cow producing significantly less milk than her calculated average may be suffering from an illness, or other stress factor that is reducing her milk production abilities. Thus, the farmers can investigate this cow and resolve any issues, enabling the cow to return to health and her increased production capacity in much quicker time.

Ex. 1005 at 98. Cochrane Farm was one of the two “case studies” from Trevarthen’s thesis that is separate from the discussion of Trevarthen’s “theoretical framework.” *See* Section VII.A above. Dr. Brown-Brandl specifically quotes Trevarthen’s statement that “[f]or example, a cow producing significantly less milk than her

calculated average may be suffering from an illness, or other stress factor that is reducing her milk production abilities.” Ex. 1003 ¶ 112 (citing Trevarthen at 98).

155. First of all, I disagree that this statement supports Dr. Brown-Brandl’s incorrect suggestion that “Trevarthen also describes a logical expression” as claimed. Ex. 1003 ¶ 112. Trevarthen’s statement was not referring to any logical expression like the ones claimed in the ’515 Patent. Instead, Trevarthen was referring to the Cochrane’s potential “implementation of milking meters for every milking bail” at their farm, which was a system unrelated to RFID technology or temperature monitoring. Trevarthen, 98 (“However, the only advancement that they are realistically considering is the implementation of milking meters for every milking bail.”).

156. In addition, Trevarthen does not discuss the Cochranes measuring, analyzing, or otherwise using temperature or any other sensed data as part of their operations and does not discuss integrating such data into a system as a logical variable in a logical expression. Instead, POSAs would have understood that the Cochranes were seeking to *potentially* use milk meters to gather milk production information on a more regular basis, without relying on a third party service. Ex. 1005 at 98 (explaining that “the only advancement that they are realistically considering is the implementation of milking meters for every milking bail” to potentially “provide the ability to record the amount of milk each cow has provided

at every milking session,” which is “in contrast to the current practice of only gaining these figures once a month through the use of the herd recording services of Dairy Express.”). This would indicate to a POSA that the Cochranes were pleased with their current “RFID” system and not seeking to change that. However, they were interested in potentially adding milk meters specifically to avoid or improve upon their “current practice of only gaining these [milk production] figures once a month through the use of the herd recording services of Dairy Express.” *Id.* There is no disclosure or suggestion, for example, of using information from milk meters in any logical expression or to use an RFID device that senses animal information. Moreover, as stated above, the Cochranes used basic ear tags to identify cows, which are not capable of sensing animal information as required by the claims. *See* Ex. 1005 at 69–70. Likewise, there is no disclosure or suggestion of using such information, including information from milk meters, in any logical expression.

157. Even if the milking meters were implemented at Cochrane Farm, they would *not* have been used with an RFID device that “sensed animal information” as claimed because the Cochranes employed basic ear tags without sensors of any kind. *See, e.g.,* Ex. 1005 at 69 (“All cows in the [Cochrane’s] herd have an NLIS-compliant RFID tag attached to their right ear.”). The ear tag used at Cochrane Farm would have been understood to be a type of basic ear tag that is attached to an animal’s (e.g., a cow’s) ear. At the time of the invention, ear tags such as those

discussed at Cochrane Farm were typically rectangular in shape and around the size of a credit card but could have also been circular and around the size of a silver dollar. In any case, basic ear tags are attached to an animal's ear with a fastener that pierces the ear and is secured on the other side. A POSA would have understood that ear tags could include a low frequency RFID transponder to identify the animal. POSAs further knew that such basic ear tags did not have sensors of any kind and could not sense information or transmit any sensed information from the animal. Typically, identification information was gathered at the entrance of a barn or milking parlor. *See, e.g.,* Trevarthen, 3, 20, 25–26, 69–70. Importantly, basic ear tags like those employed at Cochrane Farm could not have been used to achieve the claims. For example, those ear tags would have been externally attached to the ear on the outside of the animal. Under no circumstance would they have been “implanted” or “in an animal.” Nor would they have “sensed animal information.”

158. Moreover, the examples of “milk” information relied on by Petitioners and Dr. Brown-Brandl would not have disclosed or suggested the claimed invention. For example, the Cochranes were seeking to implement milking meters to “provide the ability to record the amount of milk each cow has provided at every milking session.” *See* Trevarthen, 98. They were not seeking to integrate that information with data from a separate RFID-based method or providing that information as part of any alert or logical expression. *Id.* Instead, the Cochranes were considering using

milk meters to more regularly “record the amount of milk each cow has provided at every milking session . . . in contrast to the current practice of only gaining these figures once a month through the use of the herd recording services of Dairy Express.” Trevarthen, 98.

159. At page 109, Trevarthen again refers to milk production in the context of milk meters with respect to his “theoretical framework” in Section 6.3.3.2 (titled “Enhancing Capabilities”). Here is the entirety of that discussion:

Beyond their current abilities, it is believed that future development of these automated feed bins could provide enhanced benefits for the farmers. Firstly, the use of milk meters to record the amount of milk produced by each cow at every milking session will also enable greater possibilities for extending the capabilities of feed bins. Utilising such an approach will enable feed amounts to be derived upon the most recent data of cow milk production, thus enabling feed amounts to adapt to meet the changing requirements of each cow.

Utilising milk meters will also allow an average milk production value to be derived and utilised in calculating the amount of feed to provide for each cow. This average may be taken from the production of the cow during their entire current lactation cycle, or perhaps derived from a selected amount of previous milking sessions (e.g. the average milk provided over the past 10 milking sessions). This ability to refer to an entire cows production history may also enable herd management software to recognise certain patterns in the production of each cow. Subsequently, feed may be adjusted to meet these patterns (e.g. every

10 days there is a rise in the production of a certain cow, thus provide it more feed than meets its average on this day). Recognising patterns in milk production, and providing up-to-date production records to serve as the basis for feed amount calculation aids to ensure each cow is provided with the required amount of feed to sustain their current milk production, and also to encourage this production rate to increase – a vital element to maximising milk production from a herd.

Ex. 1005 at 109–110.

160. This discussion of “patterns in the production of each cow” cited by Dr. Brown-Brandl relates to the use of milk meters separate from any disclosed RFID-based system that incorporates temperature monitoring. It also would not have been viewed by a POSA as disclosing or suggesting any alert or logical expression. *See* Ex. 1003 ¶¶ 112-113 (citing Trevarthen, 109). Rather, Trevarthen was speculating about possible future capabilities of “Automated Feed-Dropping Control Units (Feed Bins)” in which milking meters are combined with automatic feed bins. Ex. 1005 at 108–109, § 6.3.3. This would not have suggested to a POSA that combining feed bins and milking meters could or would be incorporated into a system that incorporates sensed temperature data from an RFID device.

161. In fact, Trevarthen admits that combining feed bins and milking meters was “[b]eyond their current abilities” and therefore a POSA would have understood that it was not incorporated into any current system. Ex. 1005 at 109. A POSA would view this as speculation about what might or may occur in relation to feed bins in

the future. It provides no teaching or suggestion to a POSA of any logical expression or any means of providing an alert or incorporating sensed animal information or data from an RFID device implanted in an animal. Moreover, even if there were a reason to integrate milking meters and automatic feed bins into animal management software, in light of Trevarthen's admission that this was beyond current abilities, a POSA would not have seen a reasonable expectation of success in using this teaching to achieve the claims.

162. Dr. Brown-Brandl also relies on a statement from another section (§ 6.3.5.5) regarding Trevarthen's theoretical framework that "milk meters" can "aid to identify any problems that may arise in the herd (such as illness)." Ex. 1003 ¶ 112 (citing Trevarthen, 115). Below is the full context of the statement:

Utilising milk meters will also aid to identify any problems that may arise in the herd (such as illness). For example, if a cow provides a significantly lower amount of milk than their usual output, the system will be able to identify this disparity and alert the operators to check this cow when milking has completed. In this way, any illnesses or problems occurring with cows can be identified quickly and easily, subsequently enabling rapid treatment. The quicker that such issues are identified and treated, the sooner the cow can return to her normal milking and health, and thus minimise the loss of production for the dairy on the whole.

Trevarthen at 115. As with the previous two discussions, that statement does not say anything about whether milk production information is stored, whether the system makes any calculations based on a logical expression, whether the milk meters are used as part of an overall system incorporating sensed animal information or information from an implanted RFID devices as claimed, or how a POSA might implement or integrate the milk meters into the system. Again, a POSA would view Trevarthen as speculating on what data “might” or “may” be desirable to a farmer.

163. Trevarthen’s discussions of temperature monitoring are separate from any of the above discussions of milk meters. In a background section, Trevarthen first mentions a “relatively new bio-thermo RFID microchip” that is “injected into the animal (under the skin)” to allegedly “provide temperature readings when interrogated by an RFID receiver/scanner”:

“Temperature is the most important parameter to monitor in livestock” (Higgins 2003). Higgins (2003) interviews Digital Angel’s CEO Randolph Geisler, so as to gain an understanding of Digital Angel’s relatively new bio-thermo RFID microchip. These microchips are injected into the animal (under the skin), and provide temperature readings when interrogated by an RFID receiver/scanner. The article considers temperature fluctuations to be a great indicator of health problems in livestock.

Ex. 1005 at 24 (§ 2.7).

164. In a later section of the thesis, Trevarthen discusses a potential use of such devices as part of his theoretical framework. Ex. 1005 at 121 (§ 6.3.8.1). That discussion is as follows:

It is evident from the articles of Higgins (2003) and Hostetter (2003) (articles described in section 2.7), that it is possible to incorporate temperature sensing abilities into RFID microchips currently – the application of which may soon be extended to the livestock industry. Such a device will provide the temperature of the cow along with the cows unique identification number every time the tag is read by an RFID reader.

Ex. 1005 at 121. In that statement, Trevarthen acknowledges that the temperature sensors are not part of any actual system, including one that employs milk meters, because the technology has not yet been “extended to the livestock industry.” EX1005, 121. In the pages that follow, Trevarthen continues the discussion and describes hypothetical “approaches” to using temperature sensors. *Id.* at 122–123 (§§ 6.3.8.1–3). In those discussions, Trevarthen never mentions or suggests to a POSA using temperature-sensing devices in a system with milk meters.

165. As the Board recognized in the Institution Decision, relying on disparate teachings from a single reference requires establishing a reason to combine those teachings as well as a reasonable expectation of success in making the proposed combination, which Petitioners have failed to do here. *See* Paper 16, 41 (citing *Stepan*, 868 F.3d at 1346 n.1). For claim 4, Petitioners purport to show only

that “Trevarthen discloses retrieving sensed animal temperature from an RFID device coupled to a temperature sensor.” Pet., 25. In other words, they fail to even acknowledge that Trevarthen’s teachings of milk production and temperature-sensing are disparate, let alone provide a reason to combine them, even though claim 4 requires a single method that incorporates both milk information and sensed animal information.

***(b) POSAs Would Not Have Had Reason to Combine
Trevarthen’s Separate Teachings Arranged as Claimed***

166. In her discussion of claim 4, Dr. Brown-Brandl does not acknowledge Trevarthen’s distinct teaching of milk information and temperature sensing. Ex. 1003 at ¶¶ 127-128. She also does not provide a reason to combine any such teachings. *Id.* She simply identifies Trevarthen’s discussions of “temperature sensing” and “RFID microchips.” *Id.* (citing Ex. 1005 at 24-25, 102, 121-123).

167. However, I understand that the Board stated that “Petitioner provides an express motivation to combine Trevarthen’s separate disclosures, e.g., to detect illness in livestock.” Paper 16, 41 (citing Pet. 17-19). They further stated that “Trevarthen itself proposes ‘a framework for the use of RFID on dairy farms’ including ‘enhancements and ideas which could be considered as future additions to further add value’ for utilizing RFIDs in farm management.” *Id.* (citing Ex. 1005 at 99). And they stated that “[t]he enhancements include RFID boluses (Ex. 1005, 99), utilizing milk meters to detect illness (*id.* at 115), and temperature monitoring by

RFID (id. at 121–122).” *Id.* In my opinion, illness detection would not have provided a reason to incorporate Trevarthen’s milk production teachings with its separate discussion of temperature-sensing.

168. Dr. Brown-Brandl’s cited reference demonstrates why “illness detection” would not have provided a POSA with a reason to incorporate Trevarthen’s milk production and temperature sensing into an animal tracking method. In her discussion of claim 1, Dr. Brown-Brandl states that “it was well known to use milk production (yield) information, among other information, as logical variables input into a logical expression to detect illness or oestrus in a cow.” Ex. 1003 at ¶ 114 (emphasis added). I disagree. The only reference she cites to support that opinion is a theoretical model described in “de Mol” (Ex. 1033). De Mol demonstrates that the combination of milk production and “other information” (including temperature) would not have successfully detected illness.

169. In its “Conclusions,” de Mol states the following:

The results of the detection model are based on a comparison with reference data. The sensitivity is high (but depending on the chosen criterion). The specificity also seems high but may be too low for practical application, therefore additional research is directed to a reduction of the number of false positive alerts.

Ex. 1033 at 184. “Specificity” for de Mol is the ability of the test to correctly classify a cow as disease-free. $\text{Specificity} = d \text{ (true negative)} / b + d \text{ (true negative + false)}$

positive). For de Mol's study, the specificity was regarded as "too low" due to "the number of false positive alerts." *Id.* at 184. A false positive occurs when a healthy cow is incorrectly diagnosed with a disease. Because a POSA would understand, based on de Mol's conclusions, that the models provide too many false positives, they would have incorporated models like that proposed by de Mol into any logical expression. In short, a POSA would understand that de Mol is expressly cautioning against using his theoretical model in any "practical application" because it generates too many "false positive alerts." EX1033, 184. He further suggests "additional research" to reduce false positives.

170. In fact, the number of false positives generated by de Mol's model would have rendered any system that employs it unsuccessful. For instance, in the context of dairy cows, each time an illness alert is issued, the farmer would need to isolate the cow to a hospital pen and take her milk out of production until she is diagnosed by a veterinarian. False positive alerts therefore cost the farmer time, money, and loss of production, defeating the purpose of having alerts in a practical application such as herd management software.

171. De Mol also cautioned that the data collection period for his model was very long because it was two full years, including 96 cows in two different locations. *Id.* 220. A POSA would recognize that the data collection period was too long and too expensive to be practical. De Mol also states that their model was farm-

dependent, meaning that it might not work on other farms, with different conditions like geography, weather, breeds, and management methods. *Id.* 225. A POSA would recognize that an expensive, two-year data collection period for a model that might not fit her farm was impractical.

172. In short, de Mol would discourage POSAs from using his theoretical model and any model that included temperature and milk production as variables in any “practical application” because it generates too many “false positive alerts.” EX1033, 184 (suggesting “additional research” to reduce false positives). The number of false positives generated by de Mol’s model rendered it unsuitable in an animal tracking method that requires “obtaining a logical value relating to said animal.” Therefore, de Mol cannot possibly supply a reason to combine Trevarthen’s milk production and sensed temperature for purposes of improving illness detection because de Mol was incapable of reliably detecting illness when using milk production and temperature.

XI. GROUND 3 – OBVIOUSNESS OF CLAIMS 15–25 BASED ON TREVARTHEN AND ROLLINS

173. Ground 3 challenges dependent claims 15–25, which ultimately depend from claim 1, based on Trevarthen and Rollins. Based on my review of Ground 3, I conclude that it does not show obviousness for the same reasons Ground 1 does not show obviousness. First, as discussed in Section VIII, Trevarthen was not shown to be prior art. Second, Dr. Brown-Brandl and Petitioners do not rely on Rollins to

address any of the missing elements or other deficiencies I have identified in Ground 1. Instead, they rely on Rollins regarding various components related to claims 15–24, such as a “server device,” “networks,” a “client device,” “computer-executable instructions,” “personal digital assistants,” “cellular phones,” an “RFID reader that is portable.” Therefore, Ground 3 does not show that claims 15–25 are obvious.

XII. GROUND 4 – OBVIOUSNESS OF CLAIMS 1–2 BASED ON LAITINEN, BUCHANAN, AND LIAO

174. Below I explain why I disagree with Petitioners and Dr. Brown-Brandl that Laitinen, Buchanan, and Liao do not render obvious claims 1 or 2 of the ’515 Patent.

A. Elements 1[E] and 1[F]: POSAs Would Have Had No Reason to Include “An Amount of Milk Production Information or an Amount of Days Milked” in the Alleged “Logical Expressions”

175. Petitioners and Dr. Brown-Brandl identify two alleged “logical expressions” in Laitinen: (1) a “logical expression” in the form of a system that purportedly monitors when an animal is in heat based on temperature and movement measurements and (2) a mathematical function implemented at the “global level” that assesses the efficacy of animal medication across multiple “local levels.” *See* Ex. 1003 ¶¶ 160, 162. Even if these are “logical expressions,” neither of them includes “an amount of milk production information or an amount of days milked,” as required by claim 1. As I explain below, there would have been no reason for a POSA to modify either of them to include such information.

1. Laitinen's "Heat Monitoring" System

176. For reference, Petitioners and Dr. Brown-Brandl rely on the following text in Laitinen, which they characterize as describing “a first logical expression to determine if a cow is in heat”:

The application of a system based on the invention in the processes of heat control and artificial insemination is described in the following: in FIG. 5 the functions between the different elements of the system are illustrated with underlined numbers. To monitor the animals heat with a pico level device, body temperature and movement are usually measured. The obtained information is received by the local level information system (phase 1). When the local system notices that the alarm limit(s) have been reached, it signals a heat alarm (phase 2) after which its terminal unit sends a request to the global system (phase 3).

Ex. 1006 at 8:5-15; Pet. at 47; Ex. 1003 at ¶ 160. Laitinen is explaining that “[t]o monitor the animal’s heat with a pico level device, body temperature and movement are usually measured.” Ex. 1006 at 8:5–15. A POSA would understand that this means Laitinen is trying to detect the “heat” status of animal using temperature and movement data acquired directly from the animal using the “pico level” device. Laitinen does not incorporate “an amount of milk production or a number of days in milk” as claimed in that technique. In other word, in Laitinen, neither milk production nor days in milk is a factor in the determining whether a cow is in heat or whether any “alarm limit(s)” have been reached.

177. I disagree with Petitioners and Dr. Brown-Brand's reasons that Laitinen's heat application would be modified to add the claimed milk information, based on a combination with another reference, "Liao" (Ex. 1010). The only reason Dr. Brown-Brandl provides is that a POSA would have "modif[ied] Laitinen's logical expression relating to detecting heat to include milk production information . . . to improve its accuracy and reliability at determining whether a cow is in heat." Ex. 1003 at ¶ 161. Her only support for that reasoning is that "Liao teaches that milk production is also useful for determining whether a cow is in heat and ready for artificial insemination." *Id.* (citing Ex. 1010 at (9:34-10:15, 12:3-15). That is incorrect. Liao does *not* use "milk production" to determine whether a cow is in heat. Instead, Liao uses "peak milk yield" as an input in making an "insemination decision," which is very different from detecting heat. Detecting heat involves determining whether the cow is sexually receptive and can even be detected visually, such as the cow having a clear mucous vaginal discharge or if the cow stands ready to be mounted near other cows. An insemination decision, however, involves deciding the optimal time to artificially inseminate the cow. In other words, the farmer takes into account a variety of factors to determine whether an artificial insemination is likely to result in pregnancy.

178. Liao itself teaches that peak yield is independent of whether a cow is in heat. "Heat" is only referenced in Liao as an *input* into the separate insemination

decision, along with other inputs. In one example, Liao explains that “heat” is a randomly generated variable, along with other variables, provided to a farmer so that he or she can review the set of random variables. Ex. 1010 at 8:23-11:1. When presented with random sets of variables, the farmer can provide “user-generated input data” regarding whether he would make a decision, such inseminate a cow, under those conditions. *See id.* at 3:19-33 (describing how its system is “trained” with randomly-generated input parameters) and *id.* at 3:34-4:14, 8:2-29, 9:27-11:1 (same). As part of “training” the system in Liao to create “rules” to create a “decision engine” that simulates such human decisions. *See id.*

179. Notably, every reference to “heat” in Liao is either a randomly generated input or an “input” into the decision engine. The decision engine is never described as detecting or determining heat, let alone based on any specific input such as peak yield. In fact, I reviewed the Liao reference in its entirety and could not find anything in Liao that explains where its “heat” input comes from. It also does not explain what variables, if any, are used to determine heat. I also found nothing in Liao to suggest that milk production improves the “accuracy and reliability at determining whether a cow is in heat,” as Dr. Brown-Brandl and Petitioners argue. In fact, Liao does provide any reason why any of its particular input parameters (including heat or peak yield) were chosen. Therefore, Liao’s use of peak yield to

make insemination decisions would not have motivated a POSA to incorporate that input into Laitinen’s system.

180. To the extent Petitioners and Dr. Brown-Brandl are suggesting that “heat” and “insemination decisions” are essentially the same and would require the same inputs, I disagree. Liao itself makes clear that heat and insemination decisions are very different determinations. In fact, there are cases where an animal should not be inseminated when it is in heat. And there are also cases where an animal should be inseminated when heat has not been detected. Liao’s own chart is consistent with and supports that fact:

D _{rand}							Dec _U
<u>DIM</u>	<u>Peak Yield</u>	<u>Av.# Ins./ conception.</u>	<u>Heat</u>	<u>Last Heat</u>	<u>Lactation</u>	<u>BCS</u>	<u>Insem.</u>
26	50	2,0	Yes	—	2	3,0	No
60	40	2,5	Yes	21	3	3,5	Yes
120	60	3,0	Yes	23	1	2,0	Yes
70	20	1,5	Yes	22	6	3,3	No
80	40	2,0	Yes	20	4	2,3	Yes
100	50	1,0	Yes	21	5	3,2	No
⋮							
200	55	4,4	No	23	3	3,1	Yes

Ex. 1010 at 10 (highlights added). This is further evidence that Liao teaches that milk production is independent of whether a cow is in heat, not an input into heat detection itself. For these reasons, it is untrue that Liao demonstrates that its peak yield parameter is “useful” for detecting heat. For the same reasons, it is untrue that Liao supports that its peak yield parameter would improve the “accuracy and reliability” for detecting heat.

181. Liao’s descriptions of the background art and its own system provided additional reasons why a POSA would not use Liao’s peak yield input in Laitinen’s heat monitoring system. For example, Liao states the following:

Dairy farm management decision-making is generally a complex task, which is difficult to model mathematically with a satisfying degree of accuracy. Namely, in many situations, the rules underlying a particular decision are not well defined, or cannot be formulated in concrete terms by the farmer. Instead, these types of decisions may be highly influenced by the farmer's intuition, or tacit experience. For example, even if it normally is appropriate to inseminate a cow when she is approximately 60 days in milk, this is not a rigid rule. On the contrary, many other factors may have impact on an actual insemination decision for a particular animal. However, often the farmer himself/herself is not explicitly aware of exactly which these factors are, or how they influence the insemination decision. ***Therefore, it may be practically impossible to formulate a Boolean, or other mathematical model, for the decision process.***

Moreover, even if such a model could be formulated it would typically only be applicable to a particular farm or region. Other farms, regions or countries might require completely different models to satisfy the needs of the farmers who are active there.

Ex. 1010 at 1:13-2:2 (emphasis added).

182. Liao then describes a “SUMMARY OF THE INVENTION,” which states:

The object of the present invention is therefore to provide a solution, which alleviates the above problems and thus offers explicit decision support in the process of managing a dairy farm herd of livestock.

Ex. 1010 at 2:26-30.

183. In short, Liao explains that, overall, “[d]airy farm management decision-making is generally a complex task, which is difficult to model mathematically with a satisfying degree of accuracy.” *Id.* at 1:13-15. Specifically, an “insemination decision” relies on many factors, and “often the farmer himself/herself is not explicitly aware of exactly which these factors are, or how they influence the insemination decision.” *Id.* at 1:21-25. For these reasons, according to Liao, “it may be practically impossible to formulate a Boolean, or other mathematical model, for the decision process.” *Id.* at 1:25-27.

2. Laitinen’s Global Level “Function”

184. I disagree with Dr. Brown-Brandl’s that POSAs would have modified Laitinen’s “logical expression $x=f^{-1}(y,z)$ ” to incorporate “milk production”

information. Ex. 1003 at ¶¶ 161–163. POSAs would have had no reason to do that.

The supposed logical expression is referred to in Laitinen as an “inverse function.”

Laitinen describes this inverse function as follows:

An additional goal can be to find an inverse function $x=f_1(y,z)$ with which the necessary medical treatment could be found by analysing the animal's present condition. A possible embodiment of this may be based on a counter propagating network, as described, for instance, in the article Hecht-Nielsen, R., “Counterpropagation networks”, Proc. of the Int. Conf. on Neural Networks, IEEE Press, June 1987, p. 19–32. The benefit of this kind of a network is rapid learning from the given sample. In the educational phase the matrix x , transformed into a vector, and the matrixes y , m and z are inserted into the network. The network collects a representative sample of the inserted vectors into its adaptive table. In case the vectors are not sufficiently different from those already in the table, instead of creating a new vector the closest of the existing ones will be updated with the suitable update function. During classification, the network offers the vectors y and z which are closest to the input x . In other words, when the used medication is described, the network produces the most likely development process of the animal's condition. The network is also capable of searching the inverse function; by inserting vectors y , m and z one gets the medical matrix x .

Ex. 1006 at 7:35–56. In short, the so-called inverse function is not a traditional mathematical or Boolean equation. Laitinen's “inverse function” is described as a type of “Counter Propagating Network” with an “educational phase.” *Id.* at 7:37–45;

see also id. at Fig. 3. Such a system receives known inputs to learn and identify trends, relationships, and responses between the input data. After the educational phase, the network can receive inputs and provide outputs of the same data type that was part of the education phase. The outputs are based on what the system “learned” in the educational phase.

185. Specifically, Laitinen’s system is designed to analyze an animal’s past physiological responses to medical treatments to determine the appropriate treatment for the animal’s present physiological condition. Laitinen does not use Milk production in this analysis. POSAs would have been aware of good reasons not to include such data in Laitinen’s inverse function. Milk production does not exhibit a consistent or predictable response to medical treatment. Fluctuations in milk production after treatment would therefore not reliably indicate the treatment was effective, which is a required element of the education phase. In other words, incorporating milk production in Laitinen’s inverse function would introduce noise and *reduce* its reliability in selecting medication, which defeats the purpose of the system. A POSA would have been aware of this and would have had no reason to modify the function to include milk production data.

186. Specifically, POSAs would have understood that Laitinen’s inverse function is attempting to select an appropriate “medical treatment” for an animal by identifying prior treatments that produced desirable effects on certain physiological

parameters of the animal. None of the physical parameter in Laitinen are “milk production.” As Laitinen explains, “an additional goal can be to find an inverse function $x=f^l(y,z)$ with which the necessary medical treatment could be found by analysing the animal’s present condition.” EX1006, 7:35-37.

187. During Laitinen’s “educational phase,” the inverse function would assess how certain physiological parameters respond to treatment by comparing the same parameters before and after the treatment is administered. EX1006, 7:43-45. Measurements of the parameters before treatment in Laitinen are included in a vector (“y” or “initial state vector”) and include “temperature, movement, heart beat.” *Id.* at 7:6–9. The same parameters would be measured after treatment and included in the “z” or “present state” vector. *Id.* at 7:10–13. Another vector “m” would include the treatments provided to the animal. In this way, the system can “learn” how the animal responded to the treatment (m) by comparing the before (y) and after (z) measurements. To demonstrate, the function could compare the animal’s temperature before and after a treatment to determine if temperature was reduced. Once the function is “educated,” it can select an appropriate treatment based on current physiological parameters. *See* EX1006, 7:50-56. For example, if the animal’s current temperature is elevated, the inverse function could “map” that temperature to similar temperatures in the past and select a treatment that effectively decreased temperature. One way to look at it, the inverse function predicts how the current

parameters will respond to various treatments based on how the same parameters responded to treatments in the past. The system then selects a treatment that responded favorably. Laitinen never mentions or suggests using milk production as a parameter.

188. Notably, a POSA could not have used milk production in the system because they would not have considered it as an available parameter for the education phase. In other words, the necessary milk production data would not have existed before *and* after treatment. For the education phase to work, Laitinen's inverse function would require input data before *and* after medication is administered. However, when a cow is given medication, it is typically isolated to a hospital pen. In any event, its milk is typically withdrawn from production after treatment is given. When that occurs, no "milk production" data is measured until the animal is off medication and deemed healthy enough for production. Therefore, a POSA *could not* have included "milk production" as a parameter in Laitinen's inverse function. The data simply would not have been available.

189. I also disagree with Dr. Brown-Brandl's opinion that milk production data would "improve reliability" in determining "whether a cow is ill and advising on medical treatments." Ex. 1003 ¶ 163. POSAs would have considered milk production data *unreliable* for that purpose. For input data to be reliable in Laitinen's inverse function, there would have needed to be a direct and consistent cause-and-

effect relationship between the data and the medication in order to signal a medication as “effective.” For example, using temperature as an input allows the function to identify treatments that cause temperature to reduce. The system could then identify the treatment as effective at reducing fever. Milk production does not have such a cause-and-effect. Generally, milk production does not have a consistent or predictable response to medication, including when the medication is effective. Effective medication can cause milk production to increase, decrease, or stay the same, so there is no reliable cause-and-effect relationship for the function to identify. POSAs would have considered milk production to provide a poor learning signal for a counterpropagating network or similar system such as Laitinen’s “inverse function.” In short, this means that the input data is too noisy, inconsistent, or simply not responsive enough to the other input parameters to allow the system to identify the needed relationships and trends to allow the system to work. Input parameters with a poor leaning signal, such as milk production in Laitinen’s inverse function, can degrade performance in the function.

190. Even if there was a desirable or reliable cause-and-effect relationship between milk production and medication, any such effect would not be useful in an inverse function like Laitinen’s because POSAs would not have assessed the effectiveness of treatment on milk production. Milk production is an economic metric and not a direct indicator of a cow’s current health status. Treatments were

considered “effective” by POSAs simply if it makes the cow healthier or resolves the underlying medical condition. Optimizing milk production is a secondary consideration that would not be a reliable indicator of the effectiveness of a treatment. Therefore, POSAs would have had no reason to incorporate milk production data into Laitinen’s inverse function because its goal was to find effective treatments.

191. Dr. Brown-Brandl’s statement that POSAs being “aware that lowered milk production was also an indicator of illness” (even if true) would not provide a reason to incorporate milk production into Laitinen’s inverse function. Ex. 1003 at ¶ 163. Even if lowered milk production were an indicator of illness, the fact that it does not consistently or predictably respond to medication renders it unreliable and useless in Laitinen’s function.

192. Dr. Brown-Brandl further incorrectly suggests that merging temperature and milk production in a “logical expression” would increase its ability to distinguish between illnesses and other issues, such as estrus. But that would not supply a reason to incorporate milk production into Laitinen’s inverse function. Dr. Brown-Brandl states that “[b]y combining temperature and milk production as input variables to a logical expression, the POSA would have understood that dairies would have more effectively been able to determine whether temperature and milk production anomalies are indicators of illness or cause by some other issue.” Ex.

1003 at ¶ 164. That is not relevant to Laitinen’s inverse function, which has a different goal and operates on a fundamentally different principle a system for distinguishing between whether “anomalies” in temperature and milk production are illness or something else. In other words, Dr. Brown-Brandl’s hypothetical expression seeks to determine the likelihood of illness versus other issues, supposedly using combinations of temperature and milk production fluctuations. *See* Ex. 1003 at ¶ 164 (“For example, a temperature above the upper limit combined with decreased milk production would tend to indicate illness is highly likely, whereas decreased milk production without elevated temperature may suggest another issue, for example a need to change feed.”). However, Laitinen’s inverse function analyzes an animal’s past responses to medications to suggest a treatment for current conditions. It is not trying to discern the meaning of temperature and milk production anomalies.

193. Dr. Brown-Brandl relies on a modified version of the text in her “van den Berg” reference (Ex. 1023) to support that POSAs would have combined temperature and milk yield to more effectively determine whether an animal was ill or in heat. Van den Berg does not suggest to a POSA using a cow’s sensed temperature and milk yield for that purpose. Specifically, Dr. Brown-Brandl relies on a modified quote from van den Berg to suggest that he “expressly teaches that ‘one or more of the parameters [including temperature and milk yield] may be

combined ... to achieve higher accuracy’ in determining whether an animal is ill or in heat.” See Ex. 1003 ¶ 164 (citing Ex. 1023 at 4:12-22). This modified quotation lacks context. The entirety of the passage she cites is reproduced below, with the portion she modified emphasized:

According to the invention, a more reliable indication signal of heat or illness is obtainable from parameters including one or more of the following: the milk rate of flow, the temperature of a milk flow, the milk yield, and/or the number of times per given time period that an animal pays a visit to the milking parlor or the food quantity consumed in the milking parlor. These parameters for ill or estrous animals are different from those for healthy and non-estrous animals. ***One or more of the parameters may be combined with the dead time and analyzed by a computer. In doing so, to achieve a higher accuracy, especially the temperatures of each of the flows of milk from the various teats can be determined.***

Ex. 1023 at 4:12-22 (emphasis added). Dr. Brown-Brandl’s modifications of the text changes the meaning in a few ways discussed below. Viewed in the correct context, it is clear that van den Berg does *not expressly teach* that one or more of the parameters including temperature and milk yield may be combined to achieve higher accuracy in determining whether an animal is ill or in heat, as Dr. Brown-Brandl states.

194. First, Dr. Brown-Brandl’s modification suggests that van den Berg is referring to “temperature” (i.e., the cow’s body temperature). In actuality, he is

referring to “the temperature of a milk flow” as shown in the corrected text above. Those parameters are not interchangeable, particularly in the context of illness detection.

195. Temperature of the milk in a commercial dairy is sensed by devices in the milking equipment, downstream of the teat cups. The temperature sensing devices may measure one or more of the following temperatures, (1) milk temperature from an individual teat, (2) mixed-milk temperature from a single cow, or (3) mixed-milk temperature from multiple cows. Each of these temperatures could be different because of an illness in a cow, the natural variation in the milk temperature between individual cows, how milk is handled in a dairy, and issues with temperature sensors. For example, mastitis is an illness that can cause a temperature increase of the milk from the teat associated with an infected gland. Milk temperature from healthy glands will be lower than milk temperature from an infected gland. A temperature sensor in each milking cup can potentially identify mastitis in a particular gland. Where milk collected by four teat cups is combined in the claw, the sensed temperature will be an average value of milk from a single cow. The average milk temperature may be higher for a cow with mastitis, stress, environmental, or other factors discussed previously, but it may not increase sufficiently to detect an illness like mastitis. When milk produced by cows is mixed in a collection vessel, which is typical in dairies, the sensed milk temperature is the

average for the cows that contributed milk. Temperature fluctuations of milk from individual cows cannot be observed in the collection vessel and cannot be used to detect illness.

196. Second, Dr. Brown-Brandl's modification suggests that van den Berg is referring to a specific combination of "temperature and milk yield." While "the temperature of a milk flow" and "the milk yield" are listed as two "parameters" at the beginning of the cited paragraph, van den Berg never suggests combining those two specific parameters together, let alone to increase the accuracy of detecting illness or heat. Rather, van den Berg is saying that "[o]ne or more of the parameters may be combined *with the dead time* and analyzed by a computer." Ex. 1023 at 20-21 (emphasis). He is not saying anything about increasing accuracy by combining parameters such as milk yield and temperature together. He is referring to the possibility of combining one or more of the parameters with dead time specifically.

197. Third, Dr. Brown-Brandl's modification suggests that van den Berg is referring to a "'higher accuracy' in determining whether an animal is ill or in heat" when he says "achieve a higher accuracy." He is not referring to that. To me, this statement is ambiguous and subject to two interpretations, neither of which suggest that temperature and milk yield should be combined to achieve higher accuracy in determining whether an animal is ill or in heat, contrary to Dr. Brown-Brandl's suggestion. The first interpretation is that van den Berg is saying that the accuracy

of a *temperature measurement* can be increased by determining the temperature at each of the flows of milk and combining those measurements with “dead time.” The second interpretation is that temperature alone, not milk production, can be combined with “dead time” to achieve a higher accuracy, though it is not clear what the “higher accuracy” is referring to in that case. Either way, the statements cited by Dr. Brown-Brandl do not support that milk production and temperature specifically should be combined “to achieve a higher accuracy” of anything.

198. Moreover, van den Berg does not teach or suggest any system, method, or technique for distinguishing between animals that are ill versus animals that are experiencing heat or estrus (i.e., not ill). *See* Ex. 1023 at 4:12-22. After van den Berg says that “a more reliable indication signal of *heat or illness* is obtainable from parameters including one or more of the following,” he says in the next sentence that “[t]hese parameters for ill or estrous animals are different from those for healthy and non-estrous animals.” *Id.* (emphasis added). Based on the first sentence alone, a POSA would have understood that “a more reliable indication signal of heat or illness” is referring to identifying animals that are (a) ill or in heat as opposed to (b) animals that are neither ill nor in heat. Van den Berg makes this understanding clear when he says in the next sentence that the “parameters for [a] ill or estrous animals are different from those for [b] healthy and non-estrous animals.” *Id.* at 4:19-21 (brackets added).

199. Moreover, van den Berg does not use a cow's sensed temperature or milk yield in any of his purported techniques for detecting illness, so he cannot provide any motivation to use those parameters in an expression. Rather than sensing a cow's body temperature, van den Berg uses "the temperature of a *milk* flow," which is not interchangeable with body temperature. Ex. 1023 at 4:13-21. The only time van den Berg specifically discusses illness detection, as opposed to identifying an animal that is ill or in heat, van den Berg suggests using milk temperature and "***electrical conductivity*** of the milk flow" to detect mastitis. Ex. 1023 at 4:29-34 (emphasis added). A POSA would not understand either of these parameters to be sensed animal information or milk production as required by the claims.

POSAs also would not have had a reasonable expectation of success in modifying Laitinen's inverse function to achieve the claimed invention that requires sensed animal information and milk production. Again, Dr. Brown-Brandl relies on de Mol, which cannot demonstrate that "there was a high probability of success" in "[m]odifying Laitinen's logical expressions, or creating a new one, to include both sensed temperature and stored milk production information for the detection of heat or illness" or that such modification involved "known techniques." See Pet. at 49-50. As discussed in Section X.C.2(b) above, de Mol provides reasons why POSAs would not have successfully incorporated his model in any "practical application," such as the claimed herd management system, due to "the number of false positive

alerts” it generated. *See* EX1033, 184. POSAs also could not achieve the claims by incorporating de Mol’s model into Laitinen’s inverse function because, as explained above, de Mol uses milk temperature, not sensed temperature, in his models. *See, e.g.,* Ex. 1033, Abstract, 173. As explained above with respect to van den Berg, those two parameters are not interchangeable, especially for detecting illnesses.

3. Neither of Laitinen’s “Logical Expressions” Would Have Generated a “Logical Value” as Claimed

200. Even if a POSA created an “expression” using Liao’s milk production data in Laitinen’s heat monitoring system, such expression could not be “solved to determine whether the alarm limit is reached,” as Dr. Brown-Brandl argues. Ex. 1003 ¶ 166. As I explained above, milk yield is independent of heat, and thus any threshold “alarm” based on that value would not indicate heat. *See* Section XII.A.1 above. Therefore, if a POSA somehow incorporated milk production into Laitinen’s heat monitoring application along with temperature, the application would not solve for the logical value of whether the cow is in heat.

201. If a POSA input milk yield into Laitinen’s “inverse function,” the function could not be “be solved to obtain value x to indicate whether an animal is ill and to identify the appropriate medical treatment.” *See* Ex. 1003 ¶ 167. As I explain above, milk yield does not follow a consistent or predictable pattern in response to medication in animals. *See* Section XII.A.2 above. Therefore, incorporating milk yield into an inverse function like Laitinen’s would introduce

noise and render the system incapable of identifying the appropriate treatment or whether the animal was ill. Petitioners and Dr. Brown-Brandl's alleged second logical expression therefore could not be "solved" to obtain a "logical value" as claimed.

B. Element 1[B]: "Reading an RFID Device Implanted in an Animal With Said RFID Device Reader"

1. *Petitioners and Dr. Brown-Brandl Do Not Identify "an RFID Device Implanted in an Animal"*

202. Dr. Brown-Brandl provide a single paragraph in identifying where Laitinen allegedly discloses element 1[B]:

Laitinen states that its RFID device can be "an *implant* inside the animal, in which case the data it provides can be ... *read*/transcribed ... using the so-called *Radio Frequency Identification Technology*." *Id.*, 3:53-57, 5:38-42. As explained for 1[A] (*supra* §XI.A.2), the POSA would have understood that it is implicit that Laitinen's implanted RFID device is read with an RFID reader. Thus, Laitinen discloses this element.

Ex. 1003 ¶ 150 (emphasis in original). A POSA would not have understood the statement from Laitinen relied upon by Dr. Brown-Brandl as teaching the claimed "RFID device implanted in an animal." The "implant" Dr. Brown-Brandl refers to is a "[s]ensor unit" described in Laitinen, which is not the "RFID device."

203. Rather, a POSA would have understood the sensor unit to be completely separate from the RFID device, based on Laitinen's own description of the sensor unit, as shown below:

The Pico level, i.e., the lowest level comprises the technology used directly with the animals. A pico level device is attached permanently to, e.g., the animal's ear after its birth, and it functions like conventional identification tool. In other words, it replaces the presently used earmark that in Finland is provided by Maatalouden laskentakeskus Oy. The Pico level device, indicated by the reference **100** in the illustration, generally include at least the following components:

RF transmitter/receiver used in the creation of a (programmable) radio network with the local level's terminal unit. This component can also be a mere RF transmitter.

Antenna system, which in a typical application can be incorporated into the device attached to the animal.

Energy supply instruments, which normally comprise, e.g., a lithium accumulator.

Micro controller that coordinates radio transmissions between the pico and the local level and gathers parameter values from the sensors attached to the animals. When necessary, the micro controller protects data saved in the device. As a part of the micro controller or as a separate component, the pico level also features an identifier.

Censor unit connected to the micro controller for the surveillance of the animal's body temperature, occlusion, muscular action, motion or metabolic level. The censor unit can also be an implant inside the animal, in which case the data it provides can be, for instance, read/transcribed by the pico level equipment using the so-called Radio Frequency Identification Technology. It is also possible the censor unit includes components suitable for the dispersing of medicaments which enable the individual treatment of animals via a communications network, or detectors which alarm if the pico level device is detached from the animal.

Ex. 1006 at 3:28–62. A POSA would have understood Laitinen to be explaining that the “pico level device is attached permanently to, e.g., the animal’s ear after its birth” and that the *separate* “[s]ensor unit” can be “an implant inside the animal, in which case the data it provides can be, for instance, read/transcribed by the pico level equipment.” *Id.* Therefore, even where Laitinen discusses an “implant[ed]” sensor unit, he is not describing any pico level device that is an RFID device implanted in an animal.

204. Laitinen’s explanation that the “censor unit” can include “detectors which alarm if the pico level device is detached from the animal” further demonstrates that the sensor unit is separate from the external RFID device. EX1006 at 3:58-62 (“It is also possible the censor unit includes components suitable for the dispersing of medicaments which enable the individual treatment of animals

via a communications network, *or detectors which alarm if the pico level device is detached from the animal.*") (emphasis added). If the pico level device can be detached, then it must be external to the animal, not internal or an "implant." The pico level device is what would be understood to be the "RFID device."

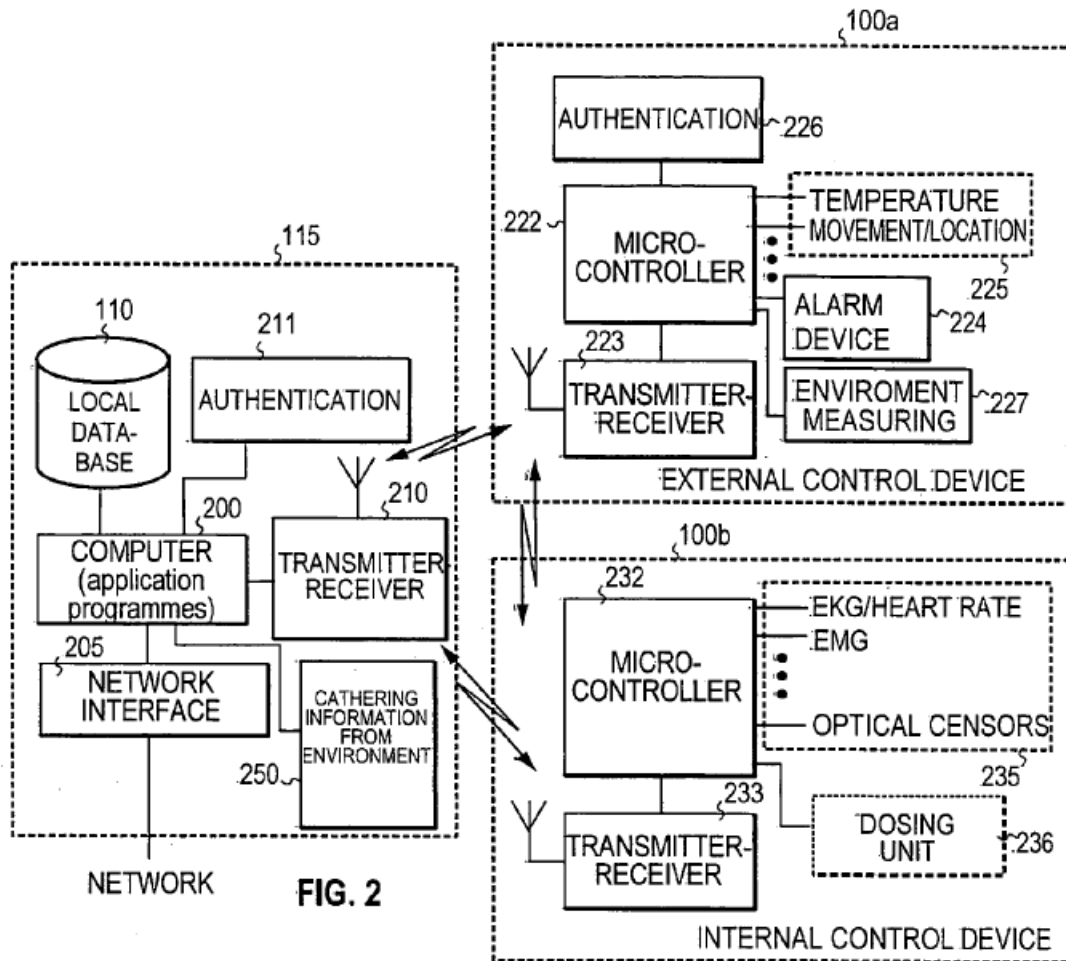
2. The Identified "Logical Expressions" Require Temperature Readings Taken from Laitinen's External Device

205. Laitinen describes two different pico level devices, including an external device for measuring temperature and an internal device for surveilling the animal's heart. *See* Ex. 1006 at 5:44–53. In other words, Laitinen teaches two distinct RFID devices that acquire distinct measurements.

206. Laitinen also makes clear that the alleged logical expressions identified by Dr. Brown-Brandl and Petitioners did not use an RFID device implanted in an animal. Therefore, Dr. Brown-Brandl and Petitioners fail to identify an RFID device implanted in an animal as used in the claimed method. As I explained above, when identifying what they claim to be "logical expressions," Petitioners and Dr. Brown-Brandl rely on the use of "temperature" as part of their proposed motivation to combine milk information into the alleged logical expressions. *See, e.g.,* Ex. 1003 ¶¶ 160–165; *see also* Section XII.A above. Laitinen clearly states that temperature is obtained only from an "external" pico device. Ex. 1006 at 5:38-55; *see also id.* at Fig. 2 (depicting an "EXTERNAL CONTROL DEVICE" that measures "TEMPERATURE"). Temperature is not obtained from any RFID device implanted

in an animal. Also as noted above, Petitioners and Dr. Brown-Brandl rely on two logical expressions that allegedly incorporate the animal “temperature.” First, they rely on Laitinen’s “heat control” application that Dr. Brown-Brandl states “monitors a cow’s temperature” and then uses the temperature data as “an input variable.” Ex. 1003 ¶ 160. Second, they rely on Laitinen’s “medical treatment” equation that uses “the animal’s temperature at different times” because, according to Dr. Brown-Brandl, “temperature correlated with animal illness.” Ex. 1003 ¶ 162.

207. The two disclosures Petitioners and Dr. Brown-Brandl rely on for “logical expressions” in Laitinen *do not* enter data from an RFID device “implanted in an animal” as claimed because Laitinen states that animal temperature is obtained from an “external” pico level device, not an RFID device “implanted in an animal.” As Laitinen explains, “[t]he external device can, for instance, measure the animal’s body temperature (with a temperature [s]ensor) or movements ... or determine the animal’s location.” Ex. 1006 at 5:44–49. Laitinen never describes an implanted or internal device as capable of such measurements. Similarly, a POSA would understand that Figure 2 of Laitinen depicts an “EXTERNAL CONTROL DEVICE” with “TEMPERATURE” and “MOVEMENT/LOCATION” inputs:



208. As shown above, Figure 2 also depicts an “INTERNAL CONTROL DEVICE” that does not have temperature or movement/location inputs. This would have confirmed to a POSA that Laitinen’s “external” device is the only device that measures temperature and therefore is the only device that would be employed in Petitioners and Dr. Brown-Brandl’s two alleged “logical expressions.”

209. Dr. Brown-Brandl does not address Laitinen’s distinction between external and internal devices that perform different functions. She does, however, cite to where Laitinen describes a “[s]ensor unit” that may be an “implant.” Ex. 1003

¶ 150 (citing Laitinen at 3:53–57); *see also id.* ¶ 177 (citing Laitinen at 3:51–57). As I discussed above, a POSA would have understood the sensor unit to be completely separate from the RFID device, based on Laitinen’s own description of the sensor unit.

210. Moreover, a POSA at the time of the invention would have reasons not to use Laitinen’s “internal device” to measure temperature. In fact, it is not clear how or where the “internal device” mentioned in Laitinen would be inserted or how it would measure data at all. Based on Laitinen’s text, POSAs would have most likely understood an “internal device” to imply an under-the-skin device. *See, e.g.,* Ex. 1006 at (“The pico level control device can be either external (100a) or implanted inside the animal’s tissue (100b).”); *see also id.* at Fig. 2. In the livestock context, an internal device would have been understood by a POSA to potentially cause tissue damage, possible infection, discomfort, and animal welfare issues. Cattle and other livestock spend most of their lives outdoors exposed to the elements. They roll on the ground, bite and scratch their skin, rub against trees and barbed fences, walk through thorn bushes, and immerse themselves in water. Cattle and other livestock are also exposed to temperature extremes and, in my personal experience, I have seen cattle arrive at the abattoir encrusted with mud, scarred, bruised, and bloody, which POSAs believed could impact measurements with an internal device. Additionally, POSAs considered the location of the device as critical for reading

RFID data since readers are distance dependent. POSAs therefore would have had reason not to use such devices. *See, e.g.*, Ex. 1006 at 5:38–55. Laitinen’s explanation that the “censor unit” can include “detectors which alarm if the pico level device is detached from the animal” is consistent with this. EX1006 at 3:58-62. In other words, to the extent there were any concerns with “detachment” of the external temperature-sensing device, Laitinen would guide a POSA toward using this alarm technique instead of any implanted device.

211. In summary, Laitinen does not disclose an RFID device implanted in an animal that uses temperature data. Petitioners and Dr. Brown-Brandl rely on temperature as alleged variables in “logical expressions.” But Laitinen makes clear that such measurements can only be obtained with external devices. Petitioners and Dr. Brown-Brand therefore do not show that Laitinen discloses or renders obvious the use of an RFID device “implanted in an animal” or “implanted in a plurality of animals” as required by the claims.

C. Element 1[C]: “Retrieving an Amount of Animal Identification Information from Said RFID Device Implanted in an Animal”

212. Petitioners and Dr. Brown-Brandl do not identify the step of “retrieving an amount of animal identification information from said RFID device implanted in an animal,” as required by element 1[C]. With respect to Laitinen, the entirety of Dr. Brown’s argument for element 1[C] is as follows:

Laitinen describes its system as “a system of individual **animal identification.**” Laitinen, 2:47-48; *see also id.* 6:2-4 (“Each surveillance device includes a **personalized identifier for the correct identification of the animal** in question.”). Laitinen explain that such a “pico level device is attached permanently to [an animal], and it **functions like conventional identification tool.**” Laitinen, 3:28-35; *see also id.*, 6:2-4 (“Each surveillance device includes a **personalized identifier** for the correct identification of the animal in question.”).

Ex. 1003 ¶ 151. As shown, Dr. Brown-Brandl is stating that Laitinen’s pico level device “functions like [a] conventional identification too,” but she never argues that Laitinen’s “functions” include a step of “retrieving an amount of animal identification information from said RFID device implanted in an animal” as claimed.

213. Dr. Brown-Brandl also does not argue that the step would have necessary or obvious. She simply cites to another reference (Ex. 1009, Pohlkamp) in support that “[t]he use of implanted RFID devices for animal identification was well-established.” Ex. 1003 ¶ 152. This does not explain how it would have be obvious to perform the step of “retrieving an amount of animal identification information from said RFID device implanted in an animal” using any of Laitinen’s systems.

XIII. GROUND 5 – OBVIOUSNESS OF CLAIMS 3–4 BASED ON LAITINEN, BUCHANAN, LIAO, AND BRUNE

214. Ground 5 challenges dependent claims 3–4, which ultimately depend from claim 1, based on Laitinen, Buchanan, Liao, and Brune. Based on my review of Ground 5, I conclude that it does not show obviousness for the same reasons Ground 4 does not show obviousness. Dr. Brown-Brandl and Petitioners do not rely on Brune to address any of the missing elements or other deficiencies I have identified in Ground 4. Instead, they rely on Brune only regarding “retrieving an amount of date-time information from said plurality of RFID devices implanted in said plurality of animals,” which is a further requirement of claim 3. Therefore, Ground 2 does not show that claims 3–4 are obvious.

215. Petitioners and Dr. Brown-Brandl also do not show that claim 4 is disclosed or rendered obvious by Laitinen for additional reasons. Claim 4 requires “retrieving an amount of sensed animal information from said plurality of RFID devices implanted in said plurality of animals.” However, Petitioners only identify the “[s]ensor unit” described in Laitinen, which allegedly provides uses “GPS,” but the sensor unit is not an “RFID device.” *See* Ex. 1003 at ¶ 177; *see also* Section XII.B.1 above. Dr. Brown-Brandl refers to Laitinen’s statement that “[t]o monitor the animal’s heat with a pico level device, *body temperature* and movement are usually measured.” Ex. 1003 at ¶ 177 (emphasis in original). However, claim 4 requires an implanted device and Laitinen expressly states that temperatures are

measured with an external device. EX1006, 5:44-49, Fig. 2; *see* Section XII.B above. Petitioners and Dr. Brown-Brandl therefore do not identify any RFID device that is implanted in an animal and retrieves sensed information.

XIV. GROUND 6 – OBVIOUSNESS OF CLAIMS 15–25 BASED ON LAITINEN, BUCHANAN, LIAO, AND ROLLINS

216. Ground 6 challenges dependent claims 15–25, which ultimately depend from claim 1, based on Trevarthen and Rollins. Based on my review of Ground 6, I conclude that it does not show obviousness for the same reasons Ground 4 does not show obviousness. Dr. Brown-Brandl and Petitioners do not rely on Rollins to address any of the missing elements or other deficiencies I have identified in Ground 4. Instead, they rely on Rollins regarding various components related to claims 15–24, such as a “server device,” “networks,” a “client device,” “computer-executable instructions,” “personal digital assistants,” “cellular phones,” an “RFID reader that is portable.” Therefore, Ground 6 does not show that claims 15–25 are obvious.

217. Claim 25 requires “reading an RFID device implanted in an animal with said RFID device reader comprises reading an RFID device said RFID device part of a bolus ingested by a bovine animal.” Petitioners and Dr. Brown-Brandl do not provide a reason for a POSA to use an “RFID device” that is “part of a bolus ingested by a bovine animal” as required by the claim. Dr. Brown-Brandl acknowledge that Laitinen does disclose a bolus and argues that “[u]sing boluses as RFID implants was well known by 2008, and the art contained numerous examples of such devices.”

Ex. 1003 at ¶ 194. But she does not cite any support for that statement or identify any of the supposed “numerous examples.” The only thing she refers to is her background section (§V.A) where she explains that “the ‘rumen’ is the largest stomach compartment of a ruminant, such as a cow.” *Id.* She does provide any *reason* for a POSA to use a bolus in Laitinen. And she does not cite any art that includes a bolus.

XV. CONCLUSION

218. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information or belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Date: February 14, 2025

By: 
Timothy J. Bowser, Ph.D.

APPENDIX—LIST OF MATERIALS

Exhibit No.	Description
1001	U.S. Patent No. 9,844,206
1002	Prosecution History of U.S. Patent No. 9,844,206
1003	Declaration of Tami M. Brown-Brandl, Ph.D.
1004	CV of Tami M. Brown-Brandl, Ph.D.
1005	Trevarthen, <i>The Importance of Utilising Electronic Identification for Total Farm Management: A Case Study of Dairy Farms on the South Coast of NSW</i> (Oct. 24, 2005) (Bachelor Thesis, University of Wollongong) (“Trevarthen”)
1006	U.S. Patent No. 7,059,275 to Laitinen et al. (“Laitinen”)
1008	U.S. Patent No. 6,059,733 to Brune et al. (“Brune”)
1009	U.S. Patent App. Pub. No. 2006/0267767 to Pohlkamp et al. (“Pohlkamp”)
1010	International Patent Pub. No. WO 2007/089184A1 to Liao (“Liao”)
1011	International Patent Pub. No. WO 2006/059916A2 to Buchanan et al. (“Buchanan”)
1013	International Patent Pub. No. WO 2004/066720 to Cross et al. (“Cross”)
1014	U.S. Patent App. Pub. No. US 2004/0233971 to Meads et al. (“Meads”)
1015	J.M. Bewley et al., <i>Comparison of Reticular and Rectal Core Body Temperature in Lactating Dairy Cows</i> , 91 J. Dairy Sci. 4661 (2008)
1016	L.C. Hicks et al., <i>Comparison of Methods of Measuring Deep Body Temperatures of Dairy Cows</i> , Livestock

	Environment VI: Proceedings of the 6th International Symposium 432 (May 2001)
1017	K.T. Higgins, <i>Temperature Readings by Remote Control</i> , Food Engineering 63 (May 2003)
1018	T. Mottram et al., <i>Technical Note: A Wireless Telemetric Method of Monitoring Clinical Acidosis in Dairy Cows</i> , 64 Computers and Electronics in Agriculture 45 (November 2008)
1020	T.M. Brown-Brandl et al., <i>Telemetry System for Measuring Core Body Temperature in Livestock and Poultry</i> , 2001 ASAE International Meeting Sacramento, California, USA, Paper No. 01-4032 (July 30-Aug 1, 2001)
1021	D.J. Prendiville et al., <i>Radiotelemetry Systems for Measuring Body Temperature</i> , Beef Production Series No. 57 (June 2002)
1022	Amended Complaint, D.I. 25, <i>ST Reproductive Technologies, LLC d/b/a STinsight v. Smaxtec Inc. et al.</i> , No. 3:24-cv-00037 (W.D. Wis. Apr. 23, 2024)
1023	U.S. Patent No. 5,568,788 to van den Berg et al (“van den Berg”)
1024	U.S. Patent App. Pub. No. 2006/0185605 to Renz et al. (“Renz”)
1025	U.S. Patent App. Pub. No. 2007/0271320 to Tsuyuzaki (“Tsuyuzaki”).
1026	U.S. Patent App. Pub. No. 2005/0145187 to Gray (“Gray”)
1027	R. Daly & M. Organ, <i>Research Online: Digital Commons as a Publishing Platform at the University of Wollongong</i> , Australia, 35 Serials Review 149-53 (2009).
1028	International Application No. PCT/NZ2007/000286, International Search Report (March 18, 2008)

1029	International Application No. PCT/NZ2007/000286, Written Opinion of the International Search Authority (March 18, 2008)
1030	Affidavit of Nathaniel E Frank-White
1031	Declaration of June Munford in Support of <i>Inter Partes</i> Review of U.S. Patent No. 8,823, 515
1032	R.M. de Mol et al., <i>Results of a Multivariate Approach to Automated Oestrus and Mastitis Detection</i> , 48 <i>Livestock Production Science</i> 219-227 (1997)
1033	R.M. de Mol et al., <i>Description of a Detection Model for Oestrus and Diseases in Dairy Cattle Based on Time Series Analysis Combined with a Kalman Filter</i> , 22 <i>Computers and Electronics in Agriculture</i> 171–185 (1999) (“de Mol”)
1034	J.E. Hillerton, <i>Detecting Mastitis Cow-Side</i> , National Mastitis Council Annual Meeting Proceedings 48-53 (2000)
1035	G.M. Hyde, <i>Milk Yield as a Factor in Dairy Herd Management</i> (1979) (Ph.D. dissertation, University of Illinois at Urbana-Champaign)
1036	U.S. Patent No. 5,724,316 to Brunts (“Bruns”)
1037	U.S. Patent Pub. No. 2006/0161443 to Rollins (“Rollins”)
1038	U.S. Patent Pub. No. 2005/0177390 to Young et al. (“Young”)
1039	File History of U.S. Patent No. 9,844,206
Paper 18	Institution Decision
EX2001	Declaration of Dr. Timothy J. Bowser, Ph.D.
EX2005	Declaration of Timothy J. Bowser, Ph.D. Pursuant to 37 C.F.R. 42.64(b)(2)

EX2006	DOUG BANIA, BUSINESS VALUATION RESOURCES, LLC, THE COMPREHENSIVE GUIDE TO ECONOMIC DAMAGES, VOL. 2, CH. 38 (Jimmy S. Pappas et al. eds., 7th ed. 2023), https://nevium.com/wp-content/uploads/2023/12/Bania-Chapter-38.-Using-Internet-Analytic-Tools-for-Valuation-and-Damages-Calculations-in-Internet-IP-Infringement-and-Defamation-Cases.pdf
EX2007	Emory University, Goizueta Business School, <i>Become a Google Power User: Tips and Techniques</i> , https://libraries.emory.edu/media/5321
EX2008	A.M. Bellon, <i>Does animal charisma influence conservation funding for vertebrate species under the US Endangered Species Act?</i> , Environmental Economics and Policy Studies (2019)
EX2010	Deposition Transcript of Tami M. Brown-Brandl, Ph.D. (January 29, 2025)