

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SMAXTEC INC. and
SMAXTEC ANIMAL CARE GMBH,
Petitioner

v.

ST REPRODUCTIVE TECHNOLOGIES, LLC
Patent Owner.

Case: IPR2024-00875
Patent No. 9,844,206

PETITION FOR *INTER PARTES* REVIEW

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Other Authorities

83 Fed. Reg. 51,340, at 51,353 (Nov. 13, 2018)	7
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Exhibit	Description
1001	U.S. Patent No. 9,844,206
1002	Prosecution History of U.S. Patent No. 9,844,206
1003	Declaration of Dr. Tami Brown-Brandl (“ Brown-Brandl ”)
1004	CV of Dr. Tami Brown-Brandl
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 ”)
1007	[Reserved]
1008	U.S. Patent No. 6,059,733 to Brune et al. (“ Brune ”)
1009	US Patent App. Pub. No. 2006/0267767 to Pohlkamp et al. (“ Pohlkamp ”)
1010	International Patent Pub. No. WO2007/089184 to Liao (“ Liao ”)
1011	International Patent Pub. No. WO 2006/059916 to Buchanan et al. (“ Buchanan ”)
1012	[Reserved]
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)

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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)
1019	[Reserved]
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.
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, Australia</i> , 35 Serials Review 149-53 (2009).
1028	International Application No. PCT/NZ2007/000286, International Search Report (March 18, 2008)

Exhibit	Description
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
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

MANDATORY NOTICES UNDER 37 C.F.R. §42.8

Pursuant to 37 C.F.R. §42.8, Petitioner states as follows:

A. Real Parties-in-Interest (37 C.F.R. §42.8(b)(1))

smaXtec Inc. and smaXtec Animal Care GmbH are the real parties-in-interest.

B. Related Matters (37 C.F.R. §42.8(b)(2))

1. Patent Trial and Appeal Board

Petitioner has filed a concurrent *Inter Partes* Review Petition challenging the patentability of U.S. Patent No. 8,823,515, from which U.S. Patent No. 9,844,206 was filed as a continuation.

2. U.S. District Court for the Western District of Wisconsin

The following pending federal district court litigation may affect or be affected by the decision in this proceeding: *ST Reproductive Technologies, LLC d/b/a STinsight v. Smaxtec Inc. and smaXtec Animal Care GmbH*, No. 24-cv-00037 (W.D. Wis.), filed January 18, 2024. Petitioner was served with the complaint on February 2, 2024.

C. Lead and Backup Counsel and Service Information (37 C.F.R. §§42.8(b)(3) and (b)(4))

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I. INTRODUCTION

Petitioner requests *Inter Partes* Review and cancellation of claims 1-4, 6, and 17-20 (“challenged claims”) of U.S. Patent No. 9,844,206 (“the ’206 Patent”) (Ex. 1001). The ’206 patent relates to a computer-implemented animal management system for cattle that retrieves sensed animal information from implanted RFID sensors, stores animal information in a database, and analyzes that information. Ex. 1001, 2:30-41.

The prior art describes cattle management systems having nearly identical hardware and software elements as claimed in the ’206 patent. Trevarthen (Ex. 1005) and Laitinen (Ex. 1006) describe cattle management systems comprising implanted RFID sensors that provide animal physiological information (e.g., temperature) to a database for storage and entry into algorithms for purposes of analysis.

Claim 1 of the ’206 patent was allowed because the Examiner found “no mention of the amount of milk production information and amount of days milked information” in the prior art. Ex. 1002, 238, 345. In allowed claim 1, Patent Owner revised the limitation’s language to be “milk production or a *number of days in milk*” (“DIM”). Regardless, Trevarthen, Laitinen, Liao (Ex. 1010), and Buchanan (Ex. 1011), none of which were before the Examiner, disprove the Examiner’s conclusion, with each describing the importance of tracking milk

production and/or DIM. Independent claim 17 was allowed because the Examiner concluded that there was “no mention of receiving date-time information received from the RFID device in the prior art.” Ex. 1002, 345. But Brune (Ex. 1008), discloses an implanted device that transmits “date and/or time stamp data.” Ex. 1008, 4:1-11. Although Brune was before the Examiner, this disclosure was clearly overlooked.

Grounds 1-2 based on Trevarthen and Grounds 3-4 based on Laitinen, each independently prove that the challenged claims were unpatentable. Trial should be instituted and claims 1-4, 6, and 17-20 should be canceled.

II. REQUIREMENTS FOR INTER PARTES REVIEW UNDER 37 C.F.R. § 42.104

A. Standing

Petitioners certify that (1) the '206 patent is subject to *Inter Partes* Review (“IPR”) based on its September 15, 2009, priority date (Ex.1001, (60)), and (2) Petitioners are not barred or estopped from the requested review.

B. Identification of Challenges

Pursuant to 37 C.F.R. §§42.104(b) and 42.22(a)(1), Petitioners request review and cancellation of the challenged claims on the following grounds:

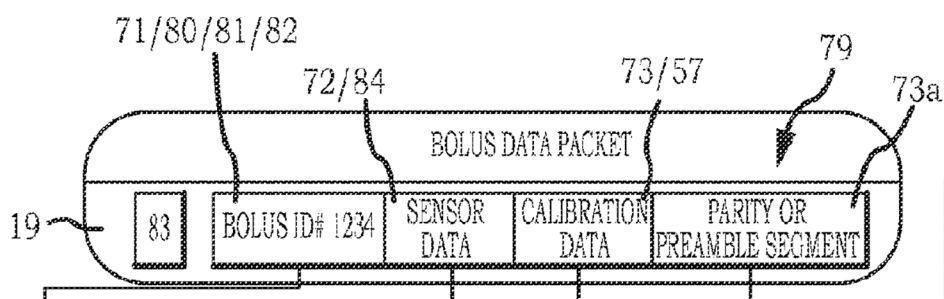
Ground	Claims	Basis	References
1	1-4 and 6	§103	Trevarthen
2	17-20	§103	Trevarthen and Brune
3	1-4 and 6	§103	Laitinen, Buchanan, and Liao
4	17-20	§103	Laitinen and Brune

III. THE '206 PATENT

The '206 patent was filed August 29, 2014, as a continuation of U.S. Application No. 13/391,614, which was filed as International Application No. PCT/US2010/002509 on September 14, 2010, which claims priority to U.S. Provisional Application No. 61/276,723, filed on September 15, 2009.

A. Specification

The '206 patent (Ex. 1001), is titled “Computer Implemented Animal Management System.” Ex. 1003 (“Brown-Brandl”), ¶¶83-87. The disclosed system comprises an RFID device (19) contained within an implantable bolus that has sensors to sense animal information such as temperature and pH (Ex. 1001, 10:30-53), depicted in Figure 3 below.



Ex. 1001, Figure 3, 3:16-21. The specification states that the RFID device is “conventional” and that it, and the sensors, were commercially available. *Id.*, 1:25-59, 10:53-61. Animal information is retrieved from the RFID device by a conventional RFID reader and input into a database. *Id.*, 2:30-41, 10:17-29, 11:25-30. Animal information is analyzed to assess animal health status, such as determining whether the animal’s temperature has exceeded a threshold so that an alert can be issued. *Id.*, 2:51-58, 14:24-32. Comparing sensed values with threshold values (e.g., temperature), like the ’206 patent contemplates, was well known in the art. Brown-Brandl, ¶¶45-54.

The disclosed system is implemented using conventional computer technology and software instructions stored on available computer readable media. *Id.*, 4:22-24, 5:3-6, 5:17-23, 5:59-64, 7:59-8:3. The hardware of the ’206 patent’s system was known, and similar configurations were common in the prior art. Brown-Brandl, ¶¶34-44, 55-65, 69-82.

B. Prosecution History

The as-filed claims were rejected over Ex. 1024 (“Renz”) in view of Ex. 1025 (“Tsuyuzaki”). Ex. 1002, 175. The Examiner stated that the “computer implemented animal tracking system taught by Renz includes ... retriev[ing] an amount of animal identification from an RFID device ... retriev[ing] an amount of sensed animal information” in the form of animal temperature, “solv[ing] a logical

expression to obtain at least one logical value,” and “animal location information.” *Id.*, 176-77. Tsuyuzaki disclosed “link[ing] the animal identification information to the sensed animal information in a database, and enter[ing] the information retrieved from the bit segments in a database of the computer as logical variables into at least one logical expression.” *Id.*, 176-77.

Patent Owner amended the claims to recite that “sensed animal information received by said RFID device from a sensor coupled to said RFID device.” *Id.*, 214, 221 (arguing “Renz in view of Tsuyuzaki does not teach an RFID combined with a sensor implantable in an animal to sense a characteristic of an animal such as temperature.”). The Examiner, however, rejected the amended claims over Renz in view of Tsuyuzaki and Ex. 1026 (“Gray”), which supplied “an RFID device ... in conjunction with a biometric sensor” that “collects ... temperature.” *Id.*, 234-36.

The Examiner, however, found pending claims 10 and 11, allowable because the cited art contained “no mention of the amount of milk production information and amount of days milked information” as recited in claim 10. *Id.*, 238, 345. The Examiner also found pending claims 6 and 7 allowable because “there is no mention of receiving date-time information received from the RFID device in the prior art.” *Id.*, 345.

Patent Owner amended claim 1 to recite “match said sensed animal information ... to animal information of said animal stored in a database including ***an amount of milk production or a number of [DIM]***” from pending claim 10 (*id.*, 368)¹; added new claim 47 (*id.*, 370-71) now claim 12; and new claim 52 reciting “retrieve ***date-time information*** from said RFID device” (*id.*, 372), now claim 17.

The Examiner’s allowance stated that “previously objected subject matter has been incorporated into the independent claims, thereby rendering them allowable.” *Id.*, 385.

IV. LEVEL OF ORDINARY SKILL IN THE ART

The person of ordinary skill in the art (“POSA”) as of the claimed priority date would have had at least a bachelor’s degree in animal science, biological engineering, electrical engineering, or computer science, or a related or equivalent field, and three or more years of experience researching, developing, designing and/or evaluating RFID tracking and sensor systems for livestock management. Brown-Brandl, ¶¶24-25.

¹ Emphasis added unless otherwise indicated.

V. CLAIM CONSTRUCTION

Claim terms are construed using the standard applied in civil actions under 35 U.S.C. § 282(b), in accordance with “the ordinary and customary meaning” as understood by the POSA and the patent’s prosecution history. 37 C.F.R. § 42.100(b). The Board need only construe terms to the extent necessary to resolve disputes between the parties. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017); 83 Fed. Reg. 51,340, at 51,353 (Nov. 13, 2018). As explained below, the relied upon prior art meets the claim terms under any reasonable interpretation.

VI. CLAIMS 1-4, 6, AND 17-20 OF THE ’206 PATENT ARE UNPATENTABLE

A. Ground 1: Trevarthen Renders Claims 1-4 and 6 Obvious

1. Trevarthen

Trevarthen (Ex. 1005) is the thesis of Adam Trevarthen of the University of Wollongong. Trevarthen is pre-AIA 35 U.S.C. § 102(b) prior art that was not before the Examiner during prosecution of the ’206 patent. Trevarthen submitted the thesis on October 24, 2005, and it was publicly available as a printed publication before September 15, 2008.

a. Trevarthen’s Public Accessibility

Several indicia, supported by the Declarations of Library Information Scientist, June Munford (Ex. 1031) and Dr. Brown-Brandl, prove the public

availability and accessibility of Trevarthen before September 2008. According to the University of Wollongong's Research Online ("Research Online"), Trevarthen was published and available for download on October 22, 2006. Research Online was (and is) an open access digital archive and institutional repository that promotes the scholarly output of the University of Wollongong. Research Online ensures that "a digital copy" of each reference of published in the digital repository "is available universally on the Internet and located through search engines such as Google and Yahoo." Munford, ¶¶16-20 (citing Ex. 1027, 149). Once a publication, like Trevarthen, is "loaded onto Research Online [it] is usually available on Google the following day." Munford, ¶19 (citing Ex. 1030, Ex. A). The "easy discovery" of uploaded publications "via Google and Google Scholar increases their visibility, and the associated download statistics verify their usefulness." Ex. 1027, 150. Indeed, Trevarthen was downloaded hundreds of times before September 2008. Munford, ¶¶21-26 (citing Ex. 1030, Ex. A).

The Internet Archive confirms the public accessibility the Trevarthen thesis on Research Online on September 7 and 12, 2007, and March 22, 2008. Munford, ¶¶27-33 (citing Ex. 1030, Ex. B). *Valve Corp. v. Ironburg Inventions Ltd.*, 8 F.4th 1364, 1374-75 (Fed. Cir. 2021) (finding "the contents of webpages available through the Wayback Machine as facts that can be accurately and readily

determined from sources whose accuracy cannot reasonably be questioned.”

(cleaned up))

Dr. Brown-Brandl explains that the POSA would have regularly searched for and consulted thesis documents, like Trevarthen, through university libraries and by keyword searching internet search engines. Brown-Brandl, ¶¶25, 66-68; *GoPro, Inc. v. Contour IP Holding LLC*, 908F.3d 690, 693 (Fed. Cir. 2018) (“[W]e have determined that a single cataloged thesis in a university library was ‘sufficiently accessible to those interested in the art exercising reasonable diligence.’” (citing *In re Hall*, 781 F.2d 897, 900 (Fed. Cir. 1986))).

Trevarthen’s public accessibility is further corroborated by the March 18, 2008, International Search Report and Written Opinion of the International Searching Authority, which identified Trevarthen as reference D1. Exs., 1028; 1029. This document confirms the pre-September 2008 public accessibility of Trevarthen to the POSA searching publicly available databases using keywords including “cattle” and “RFID.” Ex. 1028; Munford, ¶¶34-39; Brown-Brandl, ¶68.

b. Trevarthen’s Disclosure

Trevarthen explains that as of 2005 “RFID is becoming globally utilized for implementing individual whole-of-life identification and tracking systems for livestock.” Trevarthen, 10. Trevarthen discloses a case study of the Cochrane dairy farm that makes “strong use of RFID technology.” *Id.*, 69. Each cow is

tagged with an RFID tag that facilitates its automatic identification, and the farm “utilize[s] a software package to aid in their herd management.” *Id.*, 69-71. For each cow “individual information is displayed” on a computer “provid[ing] a selection of information ... drawn from the central herd management database” with the cows “listed in rows, with their characteristics displayed in the corresponding columns” (*id.*, 78). When the system identifies “[c]ows requiring additional treatment, such as veterinary treatment, artificial insemination etc., are drafted to the holding paddock to the right of the drafting gates ... High producing cows, or ... show cows, are directed to a holding paddock to the left of the drafting gates.” *Id.*, 88. The software also alerts operators to issues such as “freshly calved cows, and cows who have had a penicillin injection,” allowing their milk to be segregated and disposed. *Id.*, 78-79.

Trevarthen proceeds to describe a framework that builds upon the Cochrane farm system by using RFID technology and milking meters to “record the amount of milk each cow has provided at every milking station.” *Id.*, 98, 111-112. This production data from the milk meters is automatically entered into a “database” that is part of the herd management software. *Id.*, 100, 112. Trevarthen explains that tracking milk production will “aid to identify any problems that may arise in the herd (such as illness) ... if a cow provides a significantly lower amount of milk than their usual output.” *Id.*, 115.

Trevarthen’s framework builds also upon the Cochrane dairy study by “incorporat[ing] temperature sensing abilities into RFID microchips,” which is described as “a currently available technology.” *Id.*, 121, 123 (citing Ex. 1017). Indeed, the prior art was replete with examples of temperature sensing RFID devices. Brown-Brandl, ¶¶33-54 (citing Exs. 1006; 1009-1010; 1014-1017; 1020-1021). Such RFID-sensors are used to detect a temperature “rise,” “fluctuations,” and “anomal[y].” Trevarthen, 121-122.

Trevarthen explains “reading [a cow’s] temperature will ... aid in detection and subsequent treatment of any illnesses that a cow may have attracted ... enabl[ing] the farmer to take action to minimise the spread of the illness ...” *Id.*, 121. In addition to illness, Trevarthen also explains that a “rise in temperature may also indicate that a certain cow is entering heat. *Id.*, 121-22. It is important to know when this occurs, as “this presents the farmer with a window of opportunity to artificially inseminate the cow.” *Id.*

2. Claim 1

a. 1[Pre]: “A computer implemented animal management system”

To the extent the preamble is limiting, Trevarthen describes a system using herd management software, which the POSA would have understood to be a computer-implemented animal management system. Brown-Brandl, ¶89. Trevarthen states the “ability to digitally store herd information is certainly a

valuable tool for all farms, and a necessity for those desiring to utilise RFID ... Herd management software provides farmers with this ability, providing mechanisms for them to store individual cow data into a database.” Trevarthen, 100.

b. 1[A]: “a processor communicatively coupled to a non-transitory computer readable media containing program instructions executable to ...”

The POSA would have understood that Trevarthen’s herd management “software” (*id.*, 100) necessarily comprises executable program instructions stored on computer-readable media that runs on a processor. Brown-Brandl, ¶¶90-91 (citing Exs. 1013, 13:6-9; 1014, [0044]-[0045], [0081]). Trevarthen explains that the operator may interface with the software using a “computer” (Trevarthen, 101, 104), which the POSA would have understood to meet the element of “a processor communicatively coupled to a non-transitory computer readable media containing program instructions.” *Koninklijke Philips N.V. v. Google LLC*, 948 F.3d 1330, 1338 (Fed. Cir. 2020) (holding an obviousness determination can rely “on general knowledge of a skilled artisan.”); *see also Dow Jones & Co. v. Abblaise Ltd.*, 606 F.3d 1338, 1349, 1353 (Fed. Cir. 2010) (affirming a determination of “obviousness under [a single prior art reference] in view of general knowledge in the field”) (citing *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 401(2007)).

c. **1[B]: “retrieve animal identification information from an RFID device”**

Trevarthen explains that “RFID tags, boluses or microchips form the basis of any dairy farm RFID system” and that such devices are so commonplace that “[t]here are a number of tags, boluses and microchips available from various vendors.” Trevarthen, 99-100; Brown-Brandl, ¶92. Trevarthen emphasizes the importance of obtaining animal identification information from the RFID devices on each animal, explaining that “to derive any use and subsequent benefit from the practice of *identifying every cow with RFID tags*, a farm requires an RFID reader device.” Trevarthen, 102; Brown-Brandl, ¶93. An RFID reader placed, for example, at the dairy entrance “provides the possibility for the reader to serve as the basis for a wide range of optional operations to be conducted within the dairy that require *individual identification of cows* (e.g. automatic feeding etc.).” Trevarthen, 103; *see also id.*, 106, 121.

The POSA would have understood that Trevarthen’s system identified each cow by retrieving animal identification information from the RFID device. Brown-Brandl, ¶94.

d. **1[C]: “retrieve sensed animal information from said RFID device, said sensed animal information generated by a sensor coupled to said RFID device”**

Trevarthen states that “[i]t is evident from” the literature in this field “that it is possible to *incorporate temperature sensing abilities into RFID microchips*

currently ... Such a *device will provide the temperature of the cow along with the cow's unique identification number* every time the tag is read by an RFID reader.” Trevarthen, 121. Trevarthen cites the Bio-thermo RFID as an example of an implanted RFID device with temperature sensing capability (*id.*, 24-25), states that it was “possible to incorporate temperature sensing abilities into RFID microchips,” (*id.*, 121), and discloses that “RFID temperature sensing is a currently available technology.” *Id.*, 123. Indeed, retrieving sensed temperature from implanted RFID devices was described in numerous prior art references. Brown-Brandl, ¶95. The availability of RFID-compatible temperature sensors is further corroborated by the '206 patent. Ex. 1001, 10:56-57 (disclosing the “Betachip Thermistor...distributed by BetaTHERM Sensors”).

Trevarthen further discloses that the RFID readers retrieve the sensed temperature information from the RFID device.

[A] *temperature sensing RFID device* could be read by fixed RFID readers at the entry to the dairy. Such an arrangement would ensure that *each cow has their temperature read* at a regular interval at least twice a day ... [I]t is proposed that RFID readers also be placed at other high congregation areas throughout the farm ... Under this approach, more *temperature readings* can be gained between milkings, thus providing an *enhanced ability to detect temperature variations* ...

Trevarthen, 122. Thus, Trevarthen discloses retrieving sensed animal temperature from an RFID device coupled to a temperature sensor. Brown-Brandl, ¶¶96.

- e. **1[D]: “match said sensed animal information retrieved from said RFID device to animal information of said animal stored in a database including an amount of milk production or a number of days in milk”**

Trevarthen discloses “... *record[ing] a cow[']s milk production ...*”

Trevarthen, 102. “Milk meters provide this valuable ability, *measuring the amount of milk* each cow provides at every milking session.” *Id.*, 112. “[T]his *[milk meter] information* should be automatically recorded in the herd management *database*, and associated with the cow currently ... present.” *Id.*; *see also id.*, 101 (“the information *stored* regarding each cow[']s last recorded volume of *milk production ...*”), *id.*, 100 (“data can be *automatically entered* through the use of other digital devices (such as *milk meters ...*) linked to this *database.*”), *id.*, 109 (cow’s milk “production history” may be analyzed to recognize “patterns,” thus indicating storage of such information in the database). Because the database stores milk production information for “each cow,” the data for each animal is necessarily differentiated using the cow’s animal identification information. *Id.*, 80 (“the data regarding how much milk each cow is producing is extracted from the ... database ... according to the cow’s ... *identification number.*”); Brown-Brandl, ¶¶97-98.

As explained in 1[C] (*supra* §VI.A.2.d), Trevarthen discloses retrieving sensed temperature information from the RFID device “along with the cows unique identification number every time the tag is read by an RFID reader.” *Id.*, 121. Thus, a cow’s temperature readings are also associated with the cow’s identification number. Brown-Brandl, ¶99. Trevarthen discloses that the temperature readings are stored in the database, explaining its herd management software enables farmers “to store individual cow data into [that] database,” including temperature readings. *Id.*, 100. For instance, Trevarthen teaches identifying “fluctuations,” “a rise,” and “anomalies” in temperature so that a farmer may be alerted to potential health issues. *Id.*, 121-22. Trevarthen also teaches that farmers may “view patterns of temperature change ...” with the disclosed system. *Id.*, 122. Identifying or displaying such changes over time necessarily indicates that a history of temperature measurements for a cow is stored in the database. Brown-Brandl, ¶99.

Because Trevarthen discloses that its database stores both milk production and temperature information for each cow, the POSA would have understood that the sensed temperature information for a cow would have been matched to the stored milk production information for that cow using the cow’s identification information. Brown-Brandl, ¶100.

- f. **1[E]: “enter said sensed animal information retrieved from said RFID device and said animal information**

stored in said database as logical variables into at least one logical expression”

Element 1[E] recites entering “sensed animal information,” and “entering “animal information stored in said database” that includes a cow’s “milk production or a number of [DIM]” (per element 1[D]), into a logical expression. As explained below, Trevarthen describes entering sensed temperature information as logical variables into a logical expression, and also entering stored milk production information as logical variables into a logical expression. To the extent 1[E] could broadly permit sensed and stored animal information to be entered into *separate* logical expression, then Trevarthen discloses every element of claim 1. Brown-Brandl, ¶¶101, 104. Under a construction in which 1[E] requires *both* sensed temperature and stored milk production information to be entered as logical variables into the *same* logical expression, the POSA would have been motivated to do so in Trevarthen to enhance the system’s ability to detect illness, which is an express objective. *Infra* §VI.A.2.f.iii; Brown-Brandl, ¶¶102-103.

i. Trevarthen Discloses Entering Sensed Temperature Information into a Logical Expression

Trevarthen discloses entering logical variables of sensed temperatures into a logical expression designed to detect “fluctuations in the body temperature of a cow [that] can indicate that the cow may be *falling ill*” and to issue an appropriate “alert.” Trevarthen, 121-22. The POSA would have understood that detecting

illness through temperature “fluctuations” or “anomalies” would have included entering the sensed temperature information as logical variables into a logical expression of some kind. For instance, an expression that determines the magnitude, rate of change, or variability of a sequence of temperature measurements and compares these values to corresponding thresholds. Brown-Brandl, ¶105; Trevarthen, 122. Indeed, it was well known to use logical expressions to analyze animal temperature measurements. Brown-Brandl, ¶106 (citing Ex. 1014, [0096]; Ex. 1008, 7:43-49).

In the concurrent litigation, Patent Owner asserts that 1[E] covers an “illness detection alert feature” where “the animal’s temperature readings are entered into the system to determine whether the current temperature deviates from the animal’s regular temperature.” Ex. 1022, ¶106. Therefore, Trevarthen’s disclosure is consistent with the Patent Owner’s interpretation of this element. Brown-Brandl, ¶107.

ii. Trevarthen Discloses Entering Animal Milk Production Information Stored in the Database into a Logical Expression

Trevarthen describes a logical expression that can detect issues with a cow’s milk production that may indicate illness or another issue. Brown-Brandl, ¶¶108-109. “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.” *Id.*, 98; *see also id.*, 115. Trevarthen further explains that “milk meters will also allow *an average milk production value to be derived*” and that a cow’s milk production history can be analyzed by the herd management software “*to recognise certain patterns in the production* of each cow.” *Id.*, 109. Indeed, it was well known to use logical expressions to analyze milk yield to determine whether a cow was ill. Brown-Brandl, ¶¶45-54.

The POSA would have understood Trevarthen’s calculation of a milk production average, the comparison of recent production to usual output, and the recognition of patterns, necessarily required use of one or more logical expressions having milk production information as logical input variables. Brown-Brandl, ¶109.

iii. Trevarthen Renders Obvious Entering Sensed Temperature Information and Animal Milk Production Into At Least One Logical Expression

Trevarthen does not expressly disclose a logical expression that has inputs of both sensed temperature *and* stored information that includes milk production information. Neither does the ’206 patent. Brown-Brandl, ¶¶110-111. Nevertheless, the POSA would have been motivated to input both the sensed temperature information and stored milk production information as logical variables into the same logical expression to enhance the ability to detect sick animals. Brown-Brandl, ¶¶111-116.

Trevarthen emphasizes that “animal borne disease” has “driven calls for ... individual identification and tracking of livestock ... to reduce the possibility of a disease outbreak.” *Id.*, 1; *see also id.*, 18 (“The need to control disease outbreaks is obvious...” and that outbreaks could “shut down the food supply.”).

Trevarthen expressly teaches that *both* temperature and reduced milk production are indicators of illness. *Id.*, 98, 115, 121. Thus, the POSA would have been motivated to modify Trevarthen’s logical expression to input both temperature and milk production information as logical variables. Indeed, other prior art references expresses this exact motivation. Ex. 1023, 4:13-25 (analysis of temperature and milk yield “may be combined ... to achieve a higher accuracy” for detecting “illness”); Brown-Brandl, ¶113.

Relying on the combination of two different logical variables, rather than just a single variable, would improve Trevarthen’s illness detection capabilities. Brown-Brandl, ¶¶114-116. For example, sensed temperature could be affected by environmental conditions, time of day, or the cow being in heat, rather than illness. Trevarthen, 121-22. Likewise, decreased milk production could be due to causes other than illness, such as feed. *Id.*, 80-81, 114.

Modification of Trevarthen’s expressions, or introduction of an entirely new expression, to include both temperature and milk production as input variables would have been easily accomplished. *KSR*, 550 U.S. at 416 (“The combination of

familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.”). The POSA would have understood that such an expression could have been implemented, for example, by: computing averages; determining differences (deltas) between current values and past values or averages; and determining whether certain values, deltas, or averages exceeded or dropped below a threshold. Brown-Brandl, ¶¶117-118. An expression to perform such calculations would have involved the application of straightforward algebra that was well within the skill of the POSA. *Id.*, ¶118.

The prior art demonstrates that even more sophisticated multivariate expressions were known in the art that considered both temperature and milk yield to determine whether an animal was ill or in oestrus. Ex. 1033, 173-80 (“de Mol”); Brown-Brandl, ¶119 (citing Ex. 1032, 42-44, 52; Ex. 1034, 52; Ex. 1035, 2-3, 50-53, 57-58). de Mol, for instance, teaches such an analytic model that uses equations (1)-(21) as an integrated logical expression. de Mol, 174-80. More particularly, de Mol discloses using milk yield ($Y_{M,n}$) and milk temperature (T_n), as variables input into equations (1), (2) and (3). *Id.*, 174-175. Output variables $\nabla Y_{D,n}$ and ∇T_n , are then input as variables into matrix (17a) to determine y_n , which is in turn used in equations (7), (11), (15), and (19). *Id.*, 177-179. The expression of de Mol is solved to detect oestrus or illness so alerts to be generated based on the “combinations” of the temperature and milk yield input variables. *Id.*, 173, 180-

181. The POSA would have been readily able to implement this type of combined expression in Trevarthen's system. *KSR*, 550 U.S. at 417 (“[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious....”); *Brown-Brandl*, ¶¶119-122.

g. 1[F]: “solve said at least one logical expression to obtain a corresponding at least one logical value”

Element 1[F] requires “solv[ing] said at least one logical expression to obtain a corresponding at least one logical value,” where, for example, the “logical value [can] indicate[] an occurrence of an illness.” *Ex. 1001*, 18:54-55 (claim 4); *see id.*, 14:10-13; *Ex. 1022*, ¶106 (A “logical value” as an “illness detection alert feature.”). This element is superfluous as it makes little sense to input logical variables into an expression but not to solve it. *Brown-Brandl*, ¶128.

Trevarthen discloses solving its logical expressions, wherein the solutions comprise values indicating whether the animal is ill so that an alert may be generated. Trevarthen, 122 (“[W]hen temperature fluctuations are recognised by the system, functionality could be incorporated to allow the system to *alert the farmer* of such fluctuations”). For stored milk production, “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* ...” *Id.*, 115. It follows that if sensed temperature and stored milk production for a cow are outside the range of

the expected values (e.g., higher than expected temperature and lower than expected milk production), Trevarthen's system identifies a potential illness and alerts the operator. Brown-Brandl, ¶¶123-124.

The POSA would have understood that solving the modified logical expression of 1[E] (*supra* §VI.A.2.f.iii) that uses both temperature and milk production as input variables to more reliably detect disease, would similarly result in a logical value indicating whether an animal is ill. Brown-Brandl, ¶¶125-127 (citing de Mol, 180-81). Again, this is consistent with Patent Owner's infringement pleadings, which state that elements 1[E]-1[F] are both satisfied when a "system calculates that an alert is appropriate when it 'detects even the smallest deviations from the animal's regular temperature.'" Ex. 1022, ¶106. Based in Trevarthen's teachings considered from the POSA's perspective, claim 1 "as a whole would have been obvious" *KSR*, 550 U.S. at 406.

3. Claim 2: "wherein said animal identification information further comprises said animal identification information correspondingly generated by a plurality of RFID devices implanted in a plurality of animals"

Trevarthen's "herd management" system stores information generated by a plurality of RFID devices implanted in multiple individual cows in a herd.

Trevarthen, 102 ("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.”); *id.*, 86 (“An RFID reader ... to determine the *identity of each cow* ...”); Brown-Brandl, ¶129; *supra* §VI.A.2.c.

Trevarthen describes implanting RFID boluses. Trevarthen, 99-100; *see also id.*, 20, 22 (disclosing “rumens bolus” and “rumen boluses”), 24 (“injected” RFID microchip). The POSA would have understood that a bolus, by definition, is implanted in a cow, with a rumen bolus implanted in the cow’s first stomach compartment. *Id.*, 99; Brown-Brandl, ¶130. Thus, Trevarthen teaches the elements of claim 2.

4. Claim 3: “wherein said sensed animal information comprises said sensed animal information generated by said plurality of RFID devices implanted in said plurality of animals”

Trevarthen discloses that the “sensed animal information generated by said plurality of RFID devices implanted in said plurality of animals” includes sensed temperature information for a plurality of cows. *Supra* §VI.A.2.d; Brown-Brandl, ¶131. Trevarthen discloses that “*each cow* has their temperature read at a regular interval at least twice a day,” which would permit the operator to “view patterns of temperature change among the cows.” Trevarthen, 122. Thus, Trevarthen teaches the elements of claim 3.

5. Claim 4

- a. **4[A]: “wherein said sensed animal information comprises sensed physiological information of said animal”**

Trevarthen discloses sensed animal information that includes physiological information, such as temperature, as explained for 1[C]. *Supra* §VI.A.2.d; Brown-Brandl, ¶132.

- b. **4[B]: “wherein said animal information stored in said database comprises health information associated with said animal”**

In addition to temperature and milk production information, Trevarthen discloses using the herd management software to store and to view cow health information such as “treatments”: “[F]armers are able to easily and immediately view information on individual cattle, view an entire cows history (calving date, artificial insemination dates, treatments etc.), produce reports on individual cows, selected cows or the herd as a whole etc.” Trevarthen, 101; *see also id.*, 65, 89, 93; Brown-Brandl, ¶¶133-134.

- c. **4[C]: “wherein said logical value indicates an occurrence of an illness of said animal”**

As explained for 1[E]-1[F], Trevarthen renders obvious solving a logical expression by entering temperature and milk production information into a logical expression that solves for a logical value indicating an occurrence of illness. *Supra* §§VI.A.2.f-VI.A.2.g; Brown-Brandl, ¶135.

6. Claim 6

- a. 6[A]: “wherein said animal identification information further comprises said animal identification information correspondingly generated by a plurality of RFID devices implanted in a plurality of animals”**

Trevarthen meets element 6[A] for the same reasons explained for claim 2.

Supra §VI.A.3; Brown-Brandl, ¶136.

- b. 6[B]: “wherein said sensed animal information comprises said sensed animal information generated by said plurality of RFID devices implanted in said plurality of animals”**

Trevarthen meets element 6[B] for the same reasons explained for claim 3.

Supra §VI.A.4; Brown-Brandl, ¶137.

- c. 6[C](i): “wherein said at least one logical expression solves as to a selected period of time as to said plurality of animals correspondingly associated with said animal identification information”**

Trevarthen explains that POSA’s were motivated to implement RFID cattle tracking to control the outbreak of diseases and avoid incidents such as the European mad cow disease outbreak of the 1990s. Trevarthen, 1, 3, 17-18; Brown-Brandl, ¶139. Trevarthen’s system would have permitted a farm to identify cows who may be at risk of contracting an infection because they were in contact with an infected cow during a specific period of time. *Id.* (citing Trevarthen, 18).

The POSA would have understood that the obvious logical expression of 1[E] generates solutions as to a selected period of time. *Supra* §§VI.A.2.f.i-

VI.A.2.f.ii. The POSA would have understood that these calculations necessarily involve calculations on measurements taken over a period of time. Brown-Brandl, ¶140 (citing de Mol, 180-81). For example, “average [milk production] 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*).” Trevarthen, 109.

When the RFID device is interrogated by a reader, Trevarthen’s system records “the time and date of this read to the central herd management database.” Trevarthen, 102; Brown-Brandl, ¶141. For temperature sensing, Trevarthen discloses that “each cow has their temperature read at a *regular interval at least twice a day*” when the cow enters the dairy which would permit the operator to “view patterns of temperature change among the cows.” Trevarthen, 122; *supra* §VI.A.2.f.i. Thus, it follows that Trevarthen teaches collecting sensed temperature information and milk production information over, for example, a selected five-day period with two milkings and temperature readings a day yielding a total of ten milking sessions and temperature measurements. Brown-Brandl, ¶141 (citing Trevarthen, 109, 122). Therefore, Trevarthen is solving its logical expression for a selected period of time.

d. 6[C](ii): “if a greater than selected number of said illness have occurred”

To satisfy Trevarthen’s express objective of early disease outbreak detection, the POSA would have been motivated to configure Trevarthen’s herd management system to solve the logical expression and issue an alert when a threshold number of illnesses (i.e., a selected number of illnesses) is met or exceeded. Brown-Brandl, ¶142. Solving such a logical expression to determine if illnesses meet or exceed a threshold number would follow a similar template to Trevarthen’s logical expressions that detect whether temperature exceeds a threshold temperature or milk production is below a threshold volume. *Supra* §§VI.A.2.f.i-VI.A.2.f.iii; Brown-Brandl, ¶143. It would have been routine for the POSA to configure Trevarthen’s system to alert the operator when the number of detected illnesses in the select time period (e.g., five days) exceeds a threshold value, thereby rendering 6[C](ii) obvious. Brown-Brandl, ¶144; *KSR*, 550 U.S. at 416.

B. Ground 2: Trevarthen In View of Brune Renders Claims 17-20 Obvious

Claim 17 recites “retriev[ing] date-time information from said RFID device.” Trevarthen discloses recording time-date information to the herd database, but the time-stamping is done by the RFID interrogator. Trevarthen, 102-103. Brune, however, discloses that the implantable device transmits “a data

packet [that] includes ... *date and/or time stamp data*.” Brune, 4:1-11. The POSA would have considered it obvious to implement or try applying Brune’s data packets in Trevarthen’s RFID system. Brown-Brandl, ¶145.

1. Brune

Brune (Ex. 1008) is a pre-AIA 35 U.S.C. § 102(b) prior art patent that issued May 9, 2000. Although Brune was before the Examiner, its relevant teaching was clearly overlooked. *Supra* §III.B (citing Ex. 1002, 238, 345) (Examiner was concerned with milk information rather than date-time information)

Brune discloses that a “bolus including a temperature sensor and a transmitter is placed within a stomach of the ruminant animal,” wherein the temperature readings are analyzed to determine the health of the cow. Brune, 2:4-21. Brune’s device sends a “data packet [that] includes temperature data representing the *sensed temperature* ... identification data such as an *identification number which is unique to the specific cow*, and *date and/or time stamp data* corresponding to the *discrete point in time at which the temperature was sensed* by the bolus.” *Id.*, 4:4-11; Brown-Brandl, ¶¶74-75.

If Brune’s system determines that a cow’s core body temperature exceeds a specific threshold, it may indicate sickness. Brune, 5:65-6:12. Brune’s system can also use the temperature data to determine whether a cow that “has been exposed

to high temperatures [] is experiencing heat stress,” which can result in reduced milk output. *Id.*, 6:38-51.

Claim 17

a. 17[Pre]: “A computer implemented animal management system”

To the extent the preamble is limiting, Trevarthen teaches a computer implemented animal management system. *Supra* §VI.A.2.a; Brown-Brandl, ¶146.

b. 17[A]: “a processor communicatively coupled to a non-transitory computer readable media containing program instructions executable to”

Trevarthen teaches the processor of element 17[A] as explained for 1[A]. *Supra* §VI.A.2.b; Brown-Brandl, ¶147.

c. 17[B]: “retrieve animal identification information from an RFID device implanted in an animal”

Trevarthen teaches retrieving animal identification information from an RFID device implanted in an animal as explained in 1[B] (“retriev[ing] animal identification information from an RFID device”) and claim 2 (“implanted”).

Supra §§VI.A.2.c, VI.A.3; Brown-Brandl, ¶148.

d. 17[C]: “retrieve sensed animal information from said RFID device”

Trevarthen teaches retrieving sensed temperature information from said implanted RFID device as explained for 1[C] and claim 3. *Supra* §§VI.A.2.d, VI.A.4; Brown-Brandl, ¶149.

e. **17[D]: “retrieve date-time information from said RFID device”**

Trevarthen in view of Brune renders obvious retrieving date-time information from said RFID device (Brown-Brandl, ¶150), rendering claim 17 as a whole obvious. Trevarthen discloses that “fixed readers may be utilized for the purposes of identifying a cow as she enters the milking parlour, and subsequently *recording the time and date* of this read to the central herd management database...” Trevarthen, 102; *see also id.*, 103 (“[P]lacing the RFID reader in this position allows data to be automatically recorded regarding the *time and date* that each cow enters the milking parlour, and should at least be arranged so as to display cow information (displayed via relevant interface of the herd management software) on a computer screen at the end of the dairy.”). Additionally, Trevarthen discloses identifying “fluctuations” and “anomalies” in temperature. *Id.*, 121-22. The POSA would therefore have understood that a time-series of time-date stamped temperature measurements are needed. Brown-Brandl, ¶150

Brune’s device sends “a message in the form of an air-borne signal which is transmitted from a bolus implanted within the stomach of a cow.” Brune, 4:1-3.

Brune explains:

The message or signal is preferably in the form of a data packet ... For each message, the data packet includes temperature data representing the *sensed temperature* within the stomach, identification data such as an *identification number which is unique to the specific cow*, and *date*

and/or time stamp data corresponding to the *discrete point in time at which the temperature was sensed* by the bolus.

Id., 4:3-11; *see also id.*, 2:1-16. Thus, identification information (element 17[B]), sensed temperature information (element 17[C]), and time-date information (element 17[D]) is retrieved from Brune’s device. Brown-Brandl, ¶¶152-153.

Given the importance of time-stamping to Trevarthen, it would have been obvious for the POSA to modify the RFID device of Trevarthen to include the date-time stamping capability disclosed in Brune. Brown-Brandl, ¶¶150-151. At a minimum, it would have been obvious to try having the RFID device time-stamp the retrieved information rather than the RFID reader. Additionally, Trevarthen explains that its system works with a variety of boluses, such that “the eventual choice of device to the individual farmer to select the device type that best suits their requirements and farm.” Trevarthen, 99; Brown-Brandl, ¶154. Thus, the POSA would have reasonably expected Brunes’s device to work with Trevarthen’s herd management system, at least because the same types of information are being retrieved from a similar implanted bolus. Brown-Brandl, ¶154; *KSR*, 550 U.S. at 416 (“The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.”) Moreover, date-time information is simple and well understood. Brown-Brandl, ¶¶150-151. Finally, Trevarthen discloses including GPS, which provides date-time

information, into each animal's RFID device. Trevarthen, 123; Ex. 1036, 1:57-2:2, 2:50-53. Brown-Brandl, ¶155.

f. 17[E]: “match said sensed animal information retrieved from said RFID device to animal information stored in a database”

As explained for 1[D], Trevarthen teaches matching sensed temperature information with previous temperature information and/or milk production information stored in the database for each cow using the cow's identification number. *Supra* §VI.A.2.e; Brown-Brandl, ¶156.

g. 17[F]: “enter said sensed animal information retrieved from said RFID device and said animal information stored in said database as logical variables into at least one logical expression”

As explained for 1[E], Trevarthen discloses entering sensed temperature information and stored temperature information into a logical expression for the detection of illness. *Supra* §VI.A.2.f.i; Brown-Brandl, ¶¶157-159. As confirmed by de Mol, logical expressions that included animal temperature as an input variable to detect illness were known. *Supra* §VI.A.2.f.iii

h. 17[G]: “solve said at least one logical expression to obtain a corresponding at least one logical value”

As explained for 1[E]-1[F] (*supra* §§VI.A.2.f.i, VI.A.2.g), Trevarthen's logical expression of 17[F] is solved to generate a value indicating, for example, whether a cow has a temperature outside an acceptable range, and, if so, alert the operator to potential illness. Trevarthen, 121-122; Brown-Brandl, ¶160.

Trevarthen explains that “when temperature fluctuations are recognised by the system, functionality could be incorporated to allow the system to *alert the farmer* of such fluctuations via means such as a beeper device that the farmer may carry, sending a text message to their mobile phone, or by similar rapid alert device.” Trevarthen, 122. The way that Trevarthen solves its logical expressions for sensed and stored temperature is analogous to how Patent Owner explains the coverage of this element in its pleadings. *Supra* §VI.A.2.g (citing Ex. 1022, ¶106). Again, it was known to solve a logical expression that used temperature as an input variable to detect illness and generate an alarm. Brown-Brandl, ¶160; de Mol, 175, 180-81; Ex. 1032, 43-44. Finally, it would make little sense to enter variables into a logical expression but not solve it. Brown-Brandl, ¶161.

2. Claim 18

a. 18[A]: “wherein said sensed animal information comprises sensed physiological information of said animal”

As explained for 1[C], Trevarthen discloses sensed animal information that includes physiological information, such as cow temperature. *Supra* §VI.A.2.d; Brown-Brandl, ¶162.

- b. 18[B]: “wherein said animal information stored in said database comprises health information associated with said animal”**

As explained for 4[B], Trevarthen discloses storing animal health information in its database, such as animal treatments. *Supra* §VI.A.5.b; Brown-Brandl, ¶163.

- c. 18[C]: “wherein as to a selected period of time said at least one logical value indicates occurrence of an illness of said animal associated with said animal identification information”**

As explained for 1[E]-1[F] (*supra* §§VI.A.2.f.i, VI.A.2.g) and 17[G] (*supra* §VI.B.1.h), Trevarthen describes solving a logical expression by entering temperature information for a particular animal into a logical expression that solves a logical value indicating an occurrence of illness. As explained for 6[C](i), Trevarthen’s logical expression solves for illness for a selected period of time. *Supra* §VI.A.6.c; Brown-Brandl, ¶164.

Further, as explained for 17[D] (*supra* §VI.B.1.e), date-time information would have been retrieved with animal temperature, so it would have been simple to track whether a cow was suffering from an illness during a selected time period by determining whether the cow’s temperature fluctuations exceeded a threshold value in that time period. Brown-Brandl, ¶165 Thus, implementing Trevarthen’s herd management system to solve for a logical value indicating whether a cow was

ill in a specific period of time was at most combining familiar prior art elements according to known methods to yield a predictable result. *KSR*, 550 U.S. at 416.

3. Claim 19

- a. **19[A]: “wherein said animal identification information further comprises said animal identification information correspondingly received from a plurality of RFID devices implanted in a plurality of animals”**

As explained for claim 2, Trevarthen discloses retrieving animal identification information correspondingly received from a plurality of RFID devices implanted in a plurality of animals. *Supra* §VI.A.3; Brown-Brandl, ¶166.

- b. **19[B]: “wherein said sensed animal information comprises said sensed animal information receive from said plurality of RFID devices implanted in said plurality of animals”**

As explained for claim 3, Trevarthen discloses retrieving sensed animal temperature information received from a plurality of RFID devices implanted in a plurality of animals. *Supra* §VI.A.4; Brown-Brandl, ¶167.

- c. **19[C]: “wherein said logical value indicates a number of occurrences of said illness in a plurality of animals”**

As explained for 6[C](ii), Trevarthen renders obvious that said logical value would indicate the number of occurrences of said illness. *Supra* §VI.A.6.d; Brown-Brandl, ¶168.

4. Claim 20: “wherein said logical value indicates occurrence of a greater than a pre-selected number of said illness in said plurality of animals”

As explained for 6[C](ii), Trevarthen renders obvious a logical value that indicates occurrence of a greater than a pre-selected number of said illness in said plurality of animals. *Supra* §VI.A.6.d; Brown-Brandl, ¶169.

C. Ground 3: Laitinen In View of Buchanan and Liao Renders Claims 1-4, and 6 Obvious

1. Laitinen

Laitinen (Ex. 1006) is a pre-AIA 35 U.S.C. § 102(b) prior art patent that issued June 13, 2006. Laitinen was not before the Examiner.

Laitinen describes “a system for the surveillance of animals includ[ing] identification and measuring elements attached to the animals ...” *Id.*, Abstract. Laitinen discloses a three-level architecture comprising a Pico Level, Local Level, and Global Level. Brown-Brandl, ¶¶69-72.

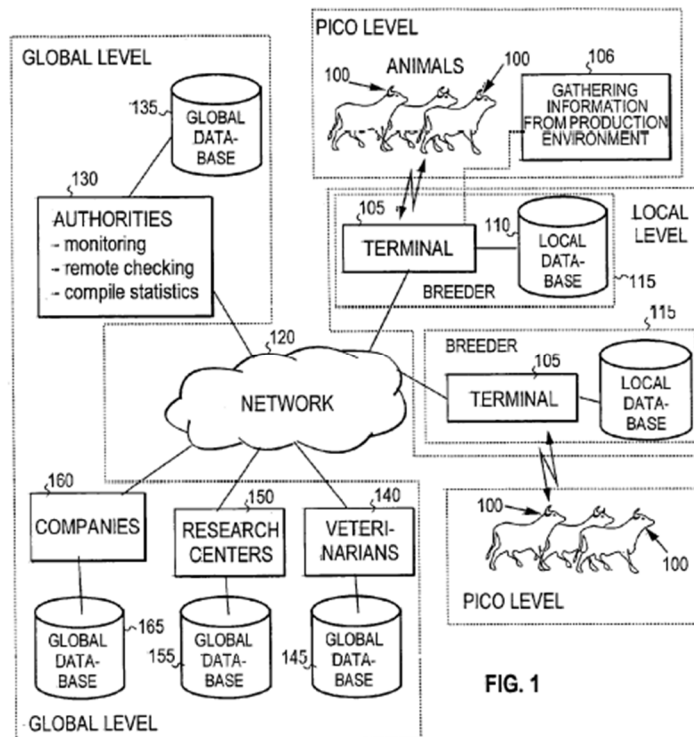


FIG. 1

Id., 3:5-6, Figure 1.

“The Pico level ... comprises the technology used directly with the animals.” *Id.*, 3:28-4:4. The pico device includes a “[s]ensor unit connected to the micro controller for the surveillance of the animal’s body temperature, occlusion, muscular action, motion or metabolic level. The [s]ensor 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.” *Id.*, 3:51-62.

The local level receives information from the pico devices. *Id.*, 6:5-15. The local level “consists in practice of one or more local **115** information systems ... at the very minimum, a local information system comprises a **105** terminal unit,

typically featuring the **110** data base into which the terminal gathers local measuring and surveillance and other important information.” *Id.*, 4:5-41.

The global level “includes a computer or computers linked to the communications network **120** and of software in the databases of which information sent by the local level is gathered, organized and refined.” *Id.*, 4:42-5:3. “[D]ata concerning an animal can be obtained from the pico and local levels throughout the animal’s entire life span ... [G]lobal level servers and databases feature algorithm and models, which are applied in the analysis of these and other possible data.” *Id.*, 5:26-30. Laitinen describes applying its system to assist in reproduction, such as detecting when a cow is in heat and performing artificial insemination. *Id.*, 8:5-26, Figure 5. Laitinen also describes entering animal information into algorithms, such as the animal’s present condition, to identify “necessary medical treatment.” *Id.*, 7:35-56; *see also* 1:33-35 (noting that “infectious diseases” are a “serious problem.”); Brown-Brandl, ¶73.

2. Buchanan

Buchanan (Ex. 1011) is a pre-AIA 35 U.S.C. § 102(b) prior art PCT patent application that published June 8, 2006. Buchanan was not before the Examiner.

Buchanan discloses a “farm management system” comprising a “database collectively receiving and storing data collected by data collection means in association with animal identifiers of individual animals.” Buchanan, 3:7-23.

Animals are identified and tracked using “RFID” tagging. *Id.*, 11:1-2 (“an RFID scanner read[s] animal identifying data from animal ID tags moving into the vicinity of the scanner.”); Brown-Brandl, ¶76.

Buchanan discloses the monitoring of a cow’s “milk volume” using “cup sensors or milk meters,” wherein the measurements are “associated with the particular animal being milked.” Brune, 19:17-31. The system can determine if the milk volume is outside a preset range and, if so, automatically draft the animal. *Id.*, 19:31-20:2; Brown-Brandl, ¶77.

Like Laitinen, Buchanan is concerned with animal reproduction and discloses automatic drafting of animals for artificial insemination in response to the detection of oestrus. Brune, 17:22-27. Buchanan teaches that detecting when a cow is in heat may involve “sensors ... taking a temperature reading from the cow[’]s stomach” and sending this information over a network for storage and “retrieval into the farm management system.” *Id.*, 21:3-8; Brown-Brandl, ¶78.

3. Liao

Liao (Ex. 1010) is a pre-AIA 35 U.S.C. § 102(b) prior art PCT patent application that published August 9, 2007. Liao was not before the Examiner.

Liao describes a system for dairy farm management comprising a computer with a software based “rules engine” and “decision engine” for making dairy farm decisions based on “animal parameters.” Liao, 2:27-3:14. The system includes a

data collection unit connected to “a number of animal-related sensor means ... i.e. sensors located on/in animals, or at implements interrelating with the animals, such as milking apparatuses.” *Id.*, 13:9-18; Brown-Brandl, ¶80.

As with Laitinen and Buchanan, Liao is concerned with animal reproduction and artificial insemination. Liao, 5:10-13; Brown-Brandl, ¶81. Liao’s decision engine determines when a cow is in heat and ready for artificial insemination by evaluating parameters for a particular animal, including the “number of [DIM]” and “peak milk yield.” *Id.*, 5:14-27, 9:34-10:15, 12:3-15. This data is stored in association with a “first input parameter reflecting an animal identity.” *Id.*, 5:14-15, 12:6-8.

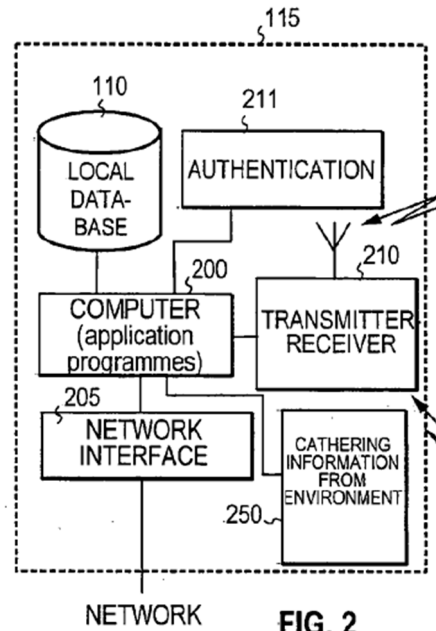
Like Laitinen, Liao is also concerned with disease, and teaches evaluating animal parameters including “relative milk yield” and “number of [DIM]” to determine if an animal should be tested for mastitis. *Id.*, 6:31-7:6, 15:16-29, 29:15-35; Brown-Brandl, ¶82. This data is also stored in association with a “first input parameter reflecting an animal identity.” Liao, 6:32-34.

4. Claim 1

a. 1[Pre]: “A computer implemented animal management system”

To the extent the preamble is limiting, it is met by Laitinen’s disclosure of a “system for the surveillance of a group of animals.” *Id.*, 1:12-18. “Based on the collected animal and farm information and expert knowledge, recommendations,

treatment measures and management decisions are taken and prognosticated on the global level.” *Id.*, 4:50-53. The system comprises “computer[s].” *Id.*, 4:5-9, 4:23-25, 4:40-49.



Id., Figure 2; Brown-Brandl, ¶170.

- b. **1[A]: “a processor communicatively coupled to a non-transitory computer readable media containing program instructions executable to”**

Laitinen discloses this element. It describes the use of a “personal computer” and a “computer.” Laitinen, 4:5-9, 4:23-25, 4:42-45, Figure 2. The POSA would have understood that referencing a computer necessarily indicates the inclusion of a processor. Brown-Brandl, ¶171. Additionally, the POSA would have understood that “gathering, assessing, and presenting data concerning the animal’s health” (Laitinen, 4:12-15) as well as implementing “algorithms and

knowledge models” (*id.*, 6:29-32) would have required program instructions, i.e., software. Brown-Brandl, ¶171. Indeed, Laitinen teaches that such “software” could be downloaded over a network or stored in a database. Laitinen, 4:40-45. Finally, the POSA would have understood that such program instructions were necessarily stored on some computer-readable media, such as a hard drive so they could be accessed and executed by the processor. Brown-Brandl, ¶172.

Koninklijke Philips, 948 F.3d at 1338 (holding obviousness can rely on “general knowledge of a skilled artisan.”); *see also Dow Jones*, 606 F.3d at 1349 (citing *KSR*, 550 U.S. at 401) (affirming “obviousness under [a single prior art reference] in view of general knowledge in the field”).

c. 1[B]: “retrieve animal identification information from an RFID device”

Laitinen discloses retrieving animal identification information from an RFID device. Brown-Brandl, ¶173. “A pico level device is attached permanently to [an animal], and it *functions like conventional identification tool[s]*.” 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.”). The 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. Brown-Brandl, ¶174 (citing Ex. 1009).

d. 1[C]: “retrieve sensed animal information from said RFID device, said sensed animal information generated by a sensor coupled to said RFID device”

Laitinen discloses a “[s]ensor” for measuring an “animal’s body temperature,” wherein the “[s]ensor unit connected to the micro controller” can be “an implant inside the animal” and the data it provides can be “read/transcribed ... using the so-called Radio Frequency Identification Technology.” Laitinen, 3:51-57; *see also id.*, 8:9-11 (“To monitor the animal’s heat with a pico level device, *body temperature* and movement are usually measured.”). The pico RFID device can provide location information using GPS. *Id.*, 3:63-67. U.S. Patent Pub. No. 2006/0267767 (Pohlkamp) also demonstrates that it was well-known to retrieve animal identification and temperature information from an implanted RFID bolus having a temperature sensor. Ex 1009, [0039], [0041], [0053]; Brown-Brandl, ¶175.

e. 1[D]: “match said sensed animal information retrieved from said RFID device to animal information of said animal stored in a database including an amount of milk production or a number of days in milk”

As discussed for 1[B] and 1[C] (*supra* §§VI.C.4.c-VI.C.4.d), Laitinen discloses retrieving animal identification and temperature information from the RFID device. Laitinen, 9:30-33 (“identification and measuring elements having a short-range transmitter-receiver (**100**) attached to the animals for identification

checking and animal-specific measuring”); Brown-Brandl, ¶176. This information is stored in a database. *Id.*, 6:36-39 (“database 31 comprises certain local measures and their corresponding results, as measured with the pico devices”), 6:10-13 (similar); *see also id.*, 7:6-25 (describing analysis of “initial” and “present” state vectors that comprise animal temperature, indicating that sensed temperature data for an animal is necessarily stored for multiple points in time).

While Laitinen does not expressly disclose storing milk production information, it provides an express motivation to do so. Laitinen states that “it is *vital* that real-time *information about the production of ... milk, is available.*” *Id.*, 1:36-38. The POSA would have appreciated that using Laitinen’s database to also track milk production of a cow would facilitate the availability of such information. Brown-Brandl, ¶177.

Buchanan discloses a farm management system that stores milk production information that satisfies the motivation presented in Laitinen. *Supra* §VI.C.2; Brown-Brandl, ¶178. More particularly, Buchanan describes milk meters for taking “milk volume ... readings to be associated with the particular animal being milked,” and sending those readings to an in-shed module. Buchanan, 19:17-31. It is then stored in a “database” where it is associated with “animal identifiers.” *Id.*, 11:18-22.

Similarly, Liao stores milk production data (“peak yield”) and DIM information for each animal. Liao, 10:1-8. Thus, there were no meaningful impediments to modifying Laitinen’s farm management system to similarly collect and store milk production information as Buchanan and Liao teach. Brown-Brandl, ¶¶179-180.

The POSA would have been additionally motivated to store milk production information in Laitinen’s database, because Laitinen and Liao were both concerned with detecting when a cow was in heat for purposes of artificial insemination. *Supra* §§VI.C.1, VI.C.3. Liao expressly teaches that both peak yield of milk and DIM information are “applicable to insemination decisions.” Liao, 9:34-11:10 (identifying DIM and peak yield as “input parameters” for insemination decisions); *see also id.*, 12:3-15. Because Laitinen was similarly concerned with determining when a cow was ready for artificial insemination (Laitinen, 8:5-39), the POSA would have been motivated to store Liao’s milk production and DIM information in Laitinen’s database for consideration in the insemination determination. Brown-Brandl, ¶181.

The POSA would also have been motivated to store milk production information and DIM information in Laitinen’s database, because Laitinen and Liao were both concerned with disease. *Id.* For example, Liao teaches that milk production information and DIM information are “input parameters” for deciding

whether to test a cow for mastitis. Liao, 15:16-29, 29:15-35. Laitinen was similarly concerned with disease. Laitinen, 1:33-35 (“infectious disease” is a “serious problem[]”); 4:60-64 (analysis of “milk samples” can reveal “mastitis”); 7:35-37 (analysis of “animal’s present condition” to determine “necessary medical treatment”). The POSA therefore would have been motivated to store Liao’s milk production information and DIM information in Laitinen’s database to detect disease.

As noted above, Laitinen discloses storing sensed animal temperature data for each animal (*supra* §VI.C.4.d), Buchanan and Liao disclose storing milk production for each animal, and Liao discloses storing DIM information for each animal, according to each animal’s identity. The POSA would have readily been able to configure Laitinen’s database to match a cow’s sensed temperature readings to its stored milk production and/or DIM information using each cow’s “personalized identifier,” rendering 1[D] obvious. Laitinen, 3:28-31, 6:2-4; Brown-Brandl, ¶182; *KSR*, 550 U.S. at 416.

- f. **1[E]: “enter said sensed animal information retrieved from said RFID device and said animal information stored in said database as logical variables into at least one logical expression”**

Element 1[E] recites entering “sensed animal information” and “entering “animal information stored in said database,” that includes a cow’s “milk production or a number of [DIM],” into a logical expression.

As explained for 1[D] (*supra* §VI.C.4.e), the POSA would have been motivated to store animal temperature, milk production, and DIM information in Laitinen’s database. Laitinen further teaches that “data concerning an animal can be obtained ... throughout the animal’s entire life span” and that the “servers and databases feature *algorithm and models, which are applied in the analysis of these and other possible data.*” Laitinen, 5:24-30. Similarly, Laitinen explains that “*algorithms and knowledge models* ... are essential to the effectiveness of the system’s services.” *Id.*, 6:29-32; Brown-Brandl, ¶183.

Laitinen discloses a first logical expression to determine if a cow is in heat. Laitinen, 8:5-15. A cow’s temperature and movement are used as the input variables, and the expression determines whether “alarm limit(s) have been reached.” *Id.*, 8:13-15; Brown-Brandl, ¶184. As indicated for 1[D] (*supra* §VI.C.4.e), Liao teaches that milk production and DIM information are also useful for determining whether a cow is in heat and ready for artificial insemination. Liao, 12:3-15. Therefore, the POSA would have been motivated to modify Laitinen’s logical expression, or create a new expression, to include milk production and/or DIM information as input variables, along with the temperature and movement information, to improve its accuracy and reliability at determining whether a cow is in heat. Brown-Brandl, ¶185.

Alternatively, Laitinen discloses a second logical expression that determines the appropriate “medical treatment” for an animal. Brown-Brandl, ¶186. More particularly, Laitinen discloses the logical expression $x=f^{-1}(y,z)$, wherein the treatment x is a function of initial state vector y and present state vector z . Laitinen, 7:6-13, 7:35-37, Figure 4. The state vectors include the animal’s temperature at different times. *Id.*, 7:6-11. Laitinen repeatedly expresses concern for detecting animal disease (*id.*, 1:33-35, 4:60-64), and therefore the POSA would have understood that the expression includes determining whether an animal is sick and identifying the appropriate treatment. Brown-Brandl, ¶186. Indeed, it was well-known in the art that temperature correlated with animal illness. Brune, 1:36-38 (“the core body temperature of a cow may rise when the cow is sick ...); Ex. 1023, 4:12-18 (milk temperature, which indicates body temperature, is a reliable indicator of illness).

Those of ordinary skill were aware that lowered milk production was also an indicator of illness. Liao, 6:31-7:6 (milk yield and DIM parameters for determining whether animal should be tested for mastitis); Ex. 1023, 4:12-18 (milk yield as a reliable indicator of illness); Brune, 6:48-50 (“heat stress may cause the milk production of a dairy cow to decrease for several days.”). Therefore, the POSA would have been motivated to modify the second logical expression of Laitinen, or create a new expression, to include milk production as an input

variable, along with temperature, to improve the reliability of its logical expression determining whether a cow is ill and advising on medical treatments. Brown-Brandl, ¶187.

By combining temperature and milk production as input variables to a logical expression, the POSA would have understood that dairies would be more effective at determining whether temperature and milk production anomalies were indicators of illness, oestrus, or caused by some other issue. Brown-Brandl, ¶188. 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. Brown-Brandl, ¶188. Indeed, van den Berg et al. (Ex 1023) 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. Ex. 1023, 4:12-22.

Modifying 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 would have involved the application of algebra, which was well within the capabilities of the POSA. *KSR*, 550 U.S. at 416-17. Indeed, as explained in Ground 1 (*supra* §VI.A.2.f.iii), even in the 1990’s it was known to use an expression to determine, based on the input variables temperature and milk

yield, whether a cow was in oestrus or ill. de Mol, 173-81; Ex. 1032, 43-44; Brown-Brandl, ¶189. Thus, there was a high probability of success given that the POSA could have used known techniques to implement an expression that uses both temperature and milk yield as input variables that improved oestrus and illness detection. Brown-Brandl, ¶189; *KSR*, 550 U.S. at 416-17.

g. 1[F]: “solve said at least one logical expression to obtain a corresponding at least one logical value”

With respect to its first disclosed logical expression used for purposes of artificial insemination, Laitinen discloses that “when the local system notices that the alarm limit(s) have been reached, it signals a heat alarm...” Laitinen, 8:12-15. The POSA would have understood that the first logical expression is being solved to determine whether the alarm limit is reached, and if so, a value is obtained that corresponds to this determination and is used to generate the heat alarm signal. Brown-Brandl, ¶190. The modified expression discussed in 1[E] also would be solved to detect if the cow is in heat. *Supra* §VI.C.4.e

With regards to its second disclosed logical expression for purposes of detecting illness and identifying appropriate medical treatment, the logical expression is given by $x=f^{-1}(y,z)$, wherein x is the appropriate medical treatment for a sick animal. Laitinen, 7:35-37. The POSA would therefore have understood that the equation is being solved for the value x . Brown-Brandl, ¶191. The

modified expressions discussed in 1[E] (*supra* §VI.C.4.f) also would be solved to determine if the animal is sick and to identify the appropriate medical treatment.

Finally, this claim element is superfluous as it makes little sense to input variables into an expression but not solve it. Brown-Brandl, ¶192. Thus, claim 1 “as a whole would have been obvious.” *KSR*, 550 U.S. at 406.

5. Claim 2: “wherein said animal identification information further comprises said animal identification information correspondingly generated by a plurality of RFID devices implanted in a plurality of animals”

Laitinen discloses that its “[s]ensor 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.” Laitinen, 3:53-57; *see also id.*, 5:38-43 (“[P]ico level devices connected to a local information system” containing sensors “can be either external (100a) or *implanted* inside the animal’s tissue (100b).”). Thus, the POSA would have understood Laitinen to teach using implanted RFID devices, which were common as of the effective date. Brown-Brandl, ¶¶193-194.

Laitinen further discloses that its invention is for “the surveillance of a *group* of animals” Laitinen, 1:12-18, Figure 1. Information is “gathered about individual animals” so that “based on the collected animal and farm information ... treatment measures and management decisions are taken.” *Id.*, 4:45-53. The POSA

would have understood from this that the RFID devices would be implanted into a group (i.e, plurality) of animals. Brown-Brandl, ¶195.

6. **Claim 3: “wherein said sensed animal information comprises said sensed animal information generated by said plurality of RFID devices implanted in said plurality of animals”**

As explained for 1[C], Laitinen discloses collecting sensed animal information, for example, temperature, location, and movement from each cow in the herd having implanted devices. *Supra* §VI.C.4.d; Brown-Brandl, ¶196.

7. **Claim 4**

a. **4[A]: “wherein said sensed animal information comprises sensed physiological information of said animal”**

As explained for 1[C], Laitinen discloses that its system collects sensed animal physiological information, including temperature and metabolic information. *Supra* §VI.C.4.d; Brown-Brandl, ¶197.

b. **4[B]: “wherein said animal information stored in said database comprises health information associated with said animal”**

Laitinen discloses storing animal health information in the database. Laitinen, for example, explains that “[g]athering, assessing and presenting data concerning the animal[’]s health, the production environment and the farm are the functions of the local system.” Laitinen, 4:12-15; *see also id.*, 5:4-8 (“Thanks to collected *historical data* and improved diagnosis methods, the system also

enables individual *health surveillance* and the creation of remote health care services. Veterinarians can collect local level information with their server 140 and refine that data in their own database 145.”); Brown-Brandl, ¶198.

c. 4[C]: “wherein said logical value indicates an occurrence of an illness of said animal”

As explained for 1[E]-1[F] (*supra* §§VI.C.4.f-VI.C.4.g), Laitinen renders obvious solving a logical expression by entering temperature and milk production information into Laitinen’s second logical expression to solve for a logical value indicating an occurrence of illness and the appropriate medical treatment. Brown-Brandl, ¶199.

8. Claim 6

a. 6[A]: “wherein said animal identification information further comprises said animal identification information correspondingly generated by a plurality of RFID devices implanted in a plurality of animals”

As explained for claim 2, Laitinen discloses implanting RFID devices in a herd or many herds (i.e., a plurality) of cattle. *Supra* §VI.C.5; Brown-Brandl, ¶200.

b. 6[B]: “wherein said sensed animal information comprises said sensed animal information generated

by said plurality of RFID devices implanted in said plurality of animals”

As explained for 1[C], Laitinen describes sensed animal information generated by a plurality of implanted RFID devices (e.g., temperature, location, and movement). *Supra* §VI.C.4.d; Brown-Brandl, ¶201.

- c. **6[C]: “wherein said at least one logical expression solves as to a selected period of time as to said plurality of animals correspondingly associated with said animal identification information if a greater than selected number of said illness have occurred”**

As explained for 1[E]–1[F], Laitinen is concerned with animal illness, and Laitinen’s second logical expression solves for the occurrence of illness in an animal and the appropriate medical treatment. *Supra* §§VI.C.4.f-VI.C.4.g. Laitinen’s system was also for “the surveillance of a group of animals.” Laitinen, 1:12-15. For example, Laitinen discloses that the gathered data can be accessed by government “authorities” and “veterinarians.” *Id.*, 4:65-5:8. Laitinen’s illness determination is made over a selected period of time, because the information input to the expression comprises an initial state vector y and a present state vector z containing the animals’ physiological data measured at discrete points in time. *Id.*, 7:6-11; Brown-Brandl, ¶¶202-203.

At least for regulatory or veterinary purposes, the POSA would have been motivated to implement Laitinen’s system to detect whether the occurrence of illnesses in a herd of cattle is greater than a selected number of illnesses to detect a

disease outbreak. Laitinen, 1:30-35 (“Infectious diseases ... have become serious problems, even on the international level.”); Brown-Brandl, ¶204. The POSA would have understood that these calculations necessarily involve calculations on measurements taken over a period of time. Brown-Brandl, ¶204 (citing de Mol, 180-81).

Implementing a system for determining the number of animals in a disease state could be accomplished, for example, by simply counting the detected occurrences of individual illnesses provided by Laitinen’s second illness-detecting expression, and then comparing whether that number exceeds a preselected threshold within a selected period of time. Brown-Brandl, ¶204; *Koninklijke Philips*, 948 F.3d at 1338 (holding obviousness can rely “on general knowledge of a skilled artisan.”); *see also Dow Jones*, 606 F.3d at 1349 (citing *KSR*, 550 U.S. at 401) (affirming “obviousness under [a single prior art reference] in view of general knowledge in the field”). Thus, claim 6 is obvious over the cited art.

D. Ground 4: Laitinen In View of Brune Renders Claims 17-20 Obvious

1. Claim 17

a. 17[Pre]: “A computer implemented animal management system”

To the extent the preamble is limiting, as explained for 1[Pre], Laitinen teaches a computer implemented animal management system. *Supra* §VI.C.4.a; Brown-Brandl, ¶205.

- b. 17[A]: “a processor communicatively coupled to a non-transitory computer readable media containing program instructions executable to”**

As explained for 1[A], Laitinen teaches this element. *Supra* §VI.C.4.b; Brown-Brandl, ¶206.

- c. 17[B]: “retrieve animal identification information from an RFID device implanted in an animal”**

Laitinen teaches retrieving animal identification information from an RFID device implanted in an animal as explained in element 1[B] (“retriev[ing] animal identification information from an RFID device”) and claim 2 (“implanted in a plurality of animals”). *Supra* §§VI.C.4.c, VI.C.5; Brown-Brandl, ¶207.

- d. 17[C]: “retrieve sensed animal information from said RFID device”**

As explained for 1[C], Laitinen teaches the retrieving sensed temperature, movement, and movement/location information from said implanted RFID device as described in element 1[C] and claim 3. *Supra* §§VI.C.4.d, VI.C.6; Brown-Brandl, ¶208.

- e. 17[D]: “retrieve date-time information from said RFID device”**

Laitinen in view of Brune renders obvious retrieving date-time information from said RFID device, rendering claim 17 as a whole obvious. The POSA would have understood that date-time information is among the information stored in the Laitinen’s databases. Brown-Brandl, ¶209. For example, Laitinen stores the time

of administration of medicaments so that the “*time elapsed*” may be calculated.

Laitinen, 7:1-3. Further, Laitinen generates an *initial* state vector and a *present* state vector containing temperatures at different points in time, indicating that the dates and times of those measurement must be stored. *Id.*, 7:6-11.

Additionally, Laitinen teaches monitoring temperature and movement to determine if a cow is in heat. *Id.*, 8:5-15. The POSA would have understood that such a system would not look at a single measurement, but would instead look at several measurements over a period of time to filter out anomalies and increase reliability. As a result, multiple temperatures and locations would be stored for analysis, each one bearing a date-time stamp. Brown-Brandl, ¶210.

Brune discloses “a bolus implanted within the stomach of a cow.” Brune, 4:1-3; Brown-Brandl, ¶211. The bolus includes a “temperature sensor and transmitter.” *Id.*, 2:4-5. A plurality of temperature values are sensed and “transmitted” using “air-borne signals” to a remote receiver. *Id.*, 2:6-11. Each transmitted message includes the temperature data, identification data unique to a specific cow, and “*date and/or time stamp data* corresponding to the *discrete point in time at which the temperature was sensed* by the bolus.” *Id.*, 4:1-11.

In view of Laitinen’s use of date-time information, and Brune’s explicit disclosure of transmitting date/time-stamped animal temperature data from an implanted bolus, the POSA would have been motivated to modify Laitinen’s RFID

system to retrieve from the bolus date-time stamp data associated with each retrieved temperature measurement. Brown-Brandl, ¶212. The likelihood of success would have been high at least because both Laitinen and Brune are retrieving similar data from an implanted animal sensor. Brown-Brandl, ¶213; *KSR*, 550 U.S. at 416. Moreover, date-time information is simple and well understood. Brown-Brandl, ¶213. Further, Laitinen teaches that the RFID device can accommodate a wide variety of sensors and hardware components including for temperature, occlusion, muscular action, motion, metabolic level, medicament disbursements, GPS, EKG, EMG, and oxygen saturation. Laitinen, 3:51-67, 5:50-55. Therefore, adding a simple clock to generate time-stamps would have been relatively easy; for example, the use of GPS would provide a date-time source. Ex. 1036, 1:57-2:2, 2:50-53; Brown-Brandl, ¶214.

f. 17[E]: “match said sensed animal information retrieved from said RFID device to animal information stored in a database”

Laitinen discloses a first logical expression that uses both body temperature and animal movement as input variables to determine if a cow is in heat. Laitinen, 8:5-11; Brown-Brandl, ¶215. This temperature and movement/location information is retrieved from the RFID device. Laitinen, 3:51-57, 3:66-67. Such information is retrieved along with the animal’s ID. *Id.*, 2:46-47, 3:29-31, 3:53-57, 6:2-4. Further, this retrieved information is stored in the database for each animal.

Id., 4:9-15, 4:45-49, 5:26-28. Indeed, determining movement requires the storage of multiple locations over time, which would confirm to the POSA that the database would store a history of location information for each animal. Brown-Brandl, ¶215. The POSA would have understood that the sensed temperature data would be matched to the stored movement/location data using the animal's identification information retrieved from the RFID device. *Id.*

Alternatively, Laitinen discloses a second expression $x=f^{-1}(y,z)$ that determines whether an animal is ill and identifies the appropriate medical treatment x based on "initial" and "present" state vectors y and z , both of which include the animal's temperature at different points in time. *Id.*, 7:6-11 ("The initial state vector y representing the same animal conveys the results obtained from the animal (e.g., *temperature* ...) *at the time* when the medication *commenced* ...

[c]onveying the *latest results* from the animal, there is also the present state vector."), 7:35-37. The POSA would have understood that the sensed present temperature measurement (a component of the present state vector z) would be matched to the previously stored initial temperature measurement (a component of the initial state vector y) using the animal's identification information retrieved from the RFID device. Brown-Brandl, ¶216.

Thus, 17[E] would be satisfied by Laitinen's teachings.

- g. 17[F]: "enter said sensed animal information retrieved from said RFID device and said animal**

information stored in said database as logical variables into at least one logical expression”

Laitinen discloses a first logical expression to determine if the cow is in heat. Laitinen, 8:5-11; *supra* §VI.C.4.f. The sensed animal temperature information retrieved from the RFID device is entered as a first input variable into this expression and the stored animal movement/location information from the database is entered as a second input variable into this expression. *Id.*, 8:11-12; *supra* §VI.D.1.f. The expression compares these variables to threshold “alarm limits” to determine whether to signal a “heat alarm.” Laitinen, 8:12-15; Brown-Brandl, ¶¶217-218.

Alternatively, Laitinen discloses a second logical expression $x=f^{-1}(y,z)$, wherein the sensed animal temperature (i.e., the temperature part of the “present state vector” z) is entered as a first input variable. Laitinen, 7:6-11, 7:35-37; *supra* §VI.C.4.f. The previously stored temperature data from the database (i.e., the temperature part of “initial state vector” y) is also entered into the expression as a second input variable. *Id.*, 4-11; Brown-Brandl, ¶219. The expression uses these initial and present temperatures to determine if an animal is ill and, if so, identify the appropriate medical treatment. Laitinen, 7:35-37. As noted previously, it was known in the art to use a “time-series” of sensed temperature measurements in a logical expression to determine if an animal was ill. de Mol, 173, 175; Ex. 1032, 42; Brown-Brandl, ¶220. Thus, 17[F] would be satisfied by Laitinen’s teachings

h. 17[G]: “solve said at least one logical expression to obtain a corresponding at least one logical value”

Laitinen’s first logical expression is solved to obtain a value indicative of whether a cow is in heat, and if so to signal a “heat alarm.” Laitinen, 8:9-15; *supra* §VI.D.1.g. Brown-Brandl, ¶221.

Alternatively, Laitinen’s second logical expression is solved using the presently sensed and previously stored temperature information to generate a value indicative of whether a cow is ill and the appropriate medical treatment x. Laitinen, 6:62-64, 7:35-37, 7:6-11; *supra* §VI.D.1.g, Brown-Brandl, ¶222.

Again, this element is superfluous as the expression serves no purpose unless solved. *Id.*, ¶223

2. Claim 18

a. 18[A]: “wherein said sensed animal information comprises sensed physiological information of said animal”

As explained for 1[C] (*supra* §VI.C.4.d), Laitinen discloses entering sensed animal temperature information in the database. Brown-Brandl, ¶224.

b. 18[B]: “wherein said animal information stored in said database comprises health information associated with said animal”

As explained for 4[B] (*supra* VI.C.7.b), Laitinen in view of Buchanan renders obvious storing animal health information in the database. Brown-Brandl, ¶225.

- c. **18[C]: “wherein as to a selected period of time said at least one logical value indicates occurrence of an illness of said animal associated with said animal identification information”**

Element 18[C] is met by Laitinen teaching of the use of a logical expression $x=f^{-1}(y,z)$ to generate a value x indicating occurrence of an illness and identifying the appropriate treatment. Laitinen, 7:1-3, 7:35-37. This determination is made over a selected period of time, because the information input to the expression comprises an initial state vector y and a present state vector z containing the animals’ physiological data measured at discrete points in time. *Id.*, 7:6-11, Figure 4; Brown-Brandl, ¶226. The occurrence of an illness is associated with said animal identification information because the sensed animal information is retrieved from the RFID device along with the animal’s identification information. Laitinen, 2:47-48, 3:28-31, 6:2-4. Further, surveillance and analysis are performed for individual cows. *Id.*, 5:26-30; 7:35-37 (“analysing the animal’s present condition”).

3. Claim 19

- a. **19[A]: “wherein said animal identification information further comprises said animal identification information correspondingly received**

from a plurality of RFID devices implanted in a plurality of animals”

As explained for claim 2 (*supra* §VI.C.5), Laitinen discloses retrieving animal identification information correspondingly received from a plurality of RFID devices implanted in a plurality of animals. Brown-Brandl, ¶227.

b. 19[B]: “wherein said sensed animal information comprises said sensed animal information receive from said plurality of RFID devices implanted in said plurality of animals”

As explained for 1[C] and claim 3 (*supra* §§VI.C.4.d, VI.C.6), Laitinen renders obvious retrieving sensed animal temperature information received from a plurality of RFID devices implanted in a plurality of animals. Brown-Brandl, ¶228.

c. 19[C]: “wherein said logical value indicates a number of occurrences of said illness in a plurality of animals”

As explained for 6[C] (*supra* §VI.C.8.c), Laitinen renders obvious that said logical value would indicate the number of occurrences of said illness when the logical expression is applied to a plurality of animals. Brown-Brandl, ¶229.

4. Claim 20: “wherein said logical value indicates occurrence of a greater than a pre-selected number of said illness in said plurality of animals”

As explained for 6[C] (*supra* §VI.C.8.c), Laitinen renders obvious a logical value that indicates occurrence of a greater than a pre-selected number of said illness in said plurality of animals. Brown-Brandl, ¶230.

VII. DISCRETIONARY DENIAL IS NOT WARRANTED

A. Section 325(b)

Institution denial based on 35 U.S.C. §325(d) is unwarranted because the arguments and evidence presented here were not previously and/or properly considered. *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 (PTAB Feb. 13, 2020) (precedential) (“*Advanced Bionics*”), *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17-18 (PTAB Dec. 15, 2017) (precedential as to §III.C.5, first paragraph).

1. *Advanced Bionics* Part One

Trevarthen, Laitinen, Buchanan, and Liao were not before the Examiner during prosecution nor are they “substantially the same” as the prior art considered by the Examiner. *Advanced Bionics*, Paper 6 at 13-19. In allowing claim 1, the Examiner asserted that the cited art contained “no mention of the amount of milk production information and amount of days milked information.” Ex. 1002, 238, 345.

Renz (Ex. 1024) relates to a cattle management system but does not disclose a database that stores milk production or DIM information in its database, much less enters such information into a logical expression. Tsuyuzaki (Ex. 1025) relates to a “semiconductor device including an IC relating ... constituted so as to generate a random number and/or probability” but does not disclose applying this

technology to managing dairy cattle. Ex. 1025, [0009]. Gray (Ex. 1026) relates to a livestock electronic monitoring system, “described in the context of beef cattle,” and therefore does not address milk production or DIM information. Ex. 1026, [0012]. In contrast, Trevarthen, Laitinen, Buchanan, and Liao each disclose amount of milk production and/or amount of days milked information, and thus are not cumulative with the references considered by the Examiner. *Supra* §§VI.A.2.e, VI.C.4.e.

Although Brune was before the Examiner, there is no evidence in the prosecution record that it was considered meaningfully, and Brune could not have been considered part of the combinations asserted here because the remaining asserted references were not before the Examiner. *St. Jude Medical, LLC v. Snyders Heart Valve LLC*, IPR2018-00105, Paper 15 at 12 (PTAB May 3, 2018) (instituting where “evidence of record does not demonstrate that the Examiner considered the references in the combinations relied upon by Petitioner or addressed arguments similar to those Petitioner now presents”).

2. *Advanced Bionics* Part Two

The record does not suggest that the Examiner meaningfully considered Brune, which favors institution. *Microsoft Corp. v. SurfCast, Inc.*, IPR2022-00590, Paper 9 at 15 (PTAB Oct. 7, 2022) (instituting where cited art “was not extensively evaluated during examination and was not the basis for a rejection”);

Amazon.com, Inc. v. M2M Sols. LLC, IPR2019-01205, Paper 14 at 16 (PTAB Jan. 27, 2020) (“a reference that ‘was neither applied against the claims nor discussed by the Examiner’ does not weigh in favor of exercising the Board’s discretion under § 325(d) to deny a petition”).

As evidence that the Examiner did not meaningfully consider Brune, the Examiner stated “there is no mention of receiving date-time information received from the RFID device in the prior art.” Ex. 1002, 345. However, Brune discloses a “*date and/or time stamp data* corresponding to the *discrete point in time at which the temperature was sensed* by the bolus.” Brune, 4:1-11. Thus, the prosecution history “demonstrate[s] that the Examiner erred in the evaluation of the prior art, for example, by ... overlook[ing the] specific teachings [in Brune] such that the error by the Office was material to the patentability of the challenged claims.” *Advanced Bionics*, Paper 6 at 21.

B. Section 314(a)

Under the Director’s Interim Procedure for Discretionary Denials (June 21, 2022) (“IP”), “the PTAB will not deny institution based on *Fintiv* if there is compelling evidence of unpatentability” (IP, 5), which this Petition provides. The *Fintiv* factors nonetheless favor institution based on efficiency, fairness, and patent quality. *Apple v. Fintiv*, IPR2020-00019, Paper 11 at 5 (Mar. 20, 2020) (“*Fintiv*”) (precedential).

1. Stay Potential

Petitioner will seek a pre-institution stay of the district court litigation, but without “specific evidence” how the court will rule, this factor is neutral. *Sand Revolution II v. Continental Intermodal Group–Trucking*, IPR2019-01393, Paper 24 at 7 (PTAB June 16, 2020) (informative).

2. Trial Timing

Because the district court has not set a trial date, Factor 2 weighs against discretionary denial. *NortonLifeLock v. Kajeet*, IPR2022-00001, Paper 20 at 9-10 (PTAB Apr. 21, 2022). Without a trial date any Factor 2 comparison is “speculative.” *NortonLifeLock* at 10; *accord Illumina v. Ravgen*, IPR2021-01271, Paper 12 at 33 (PTAB Jan. 26, 2022). The Western District of Wisconsin’s median time to trial in the year ending December 31, 2023 is 40.5 months, which would result in a June 2027 trial.² Institution approximately six months from Petition filing would result in an FWD by November 2025, which favors institution.

Petitioner’s diligence also weighs against discretionary denial — this Petition is filed within three months of being served the initial complaint. *Apple v.*

² <https://www.uscourts.gov/statistics/table/na/federal-court-management-statistics/2023/12/31-1>

Seven Networks, IPR2020-00156, Paper 10 at 9 n.8 (PTAB June 15, 2020); *Fintiv*, 11 n.21.

3. Litigation Investment

Petitioner filed this petition at an early stage of litigation and no substantive orders have issued, facts that have “weighed against exercising the authority to deny institution[.]” *Seven Networks*, Paper 10 at 11-12 (quoting *Fintiv*, Paper 15 at 11); *Amperex Tech. v. Maxell*, IPR2021-01442, Paper 16 at 10-11 (PTAB Apr. 12, 2022).

4. Issue Overlap

Only claims 1 and 17 were asserted in the district court complaint (Ex. 1022, ¶¶ 95-113), whereas additional claims are challenged here. Institution can enhance patent system integrity and meet Petitioner’s interest in resolving invalidity challenges on the challenged claims, which favors institution. *Seven Networks*, Paper 10 at 17.

5. Litigation Parties

This Petition involves the same parties as the Wisconsin case, so this factor may “depend[] on which tribunal was likely to address the challenged patent first,” which is likely the Board (*supra* §**Error! Reference source not found.**). *Google v. Parus Holdings*, IPR2020-00846, Paper 9 at 20-21 (PTAB Oct. 21, 2020).

6. Merits

The “strong showing on the merits” presented here weighs against denial.

Seven Networks, Paper 10 at 20.

VIII. CONCLUSION

For the foregoing reasons, the Petition should be instituted and the challenged claims should be canceled.

Respectfully submitted,

Dated: May 2, 2024

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WORD COUNT CERTIFICATION

Pursuant to 37 C.F.R. §42.24(d), I certify that this Preliminary Response contains 13,955 words (excluding the title page, table of contents, table of exhibits, claim listing, this certificate, and the certificate of service), as determined by Microsoft Word.

Dated: May 2, 2024

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CHALLENGED CLAIM LISTING

Claim 1
1[Pre] A computer implemented animal management system, comprising:
1[A] a processor communicatively coupled to a non-transitory computer readable media containing program instructions executable to:
1[B] retrieve animal identification information from an RFID device;
1[C] retrieve sensed animal information from said RFID device, said sensed animal information generated by a sensor coupled to said RFID device;
1[D] match said sensed animal information retrieved from said RFID device to animal information of said animal stored in a database including an amount of milk production or a number of days in milk;
1[E] enter said sensed animal information retrieved from said RFID device and said animal information stored in said database as logical variables into at least one logical expression; and
1[F] solve said at least one logical expression to obtain a corresponding at least one logical value.
Claim 2
The system of claim 1, wherein said animal identification information further comprises said animal identification information correspondingly generated by a plurality of RFID devices implanted in a plurality of animals.
Claim 3
The system of claim 2, wherein said sensed animal information comprises said sensed animal information generated by said plurality of RFID devices implanted in said plurality of animals.
Claim 4
4[A] The system of claim 1, wherein said sensed animal information comprises

sensed physiological information of said animal,
4[B] and wherein said animal information stored in said database comprises health information associated with said animal
4[C] and wherein said logical value indicates an occurrence of an illness of said animal.
Claim 6
6[A] The system of claim 4, wherein said animal identification information further comprises said animal identification information correspondingly generated by a plurality of RFID devices implanted in a plurality of animals,
6[B] wherein said sensed animal information comprises said sensed animal information generated by said plurality of RFID devices implanted in said plurality of animals,
6[C] wherein said at least one logical expression solves as to a selected period of time as to said plurality of animals correspondingly associated with said animal identification information if a greater than selected number of said illness have occurred.
Claim 17
17[Pre] A computer implemented animal management system, comprising:
17[A] a processor communicatively coupled to a non-transitory computer readable media containing program instructions executable to:
17[B] retrieve animal identification information from an RFID device implanted in an animal;
17[C] retrieve sensed animal information from said RFID device;
17[D] retrieve date-time information from said RFID device;
17[E] match said sensed animal information retrieved from said RFID device to animal information stored in a database;

17[F] enter said sensed animal information retrieved from said RFID device and said animal information stored in said database as logical variables into at least one logical expression; and
17[G] solve said at least one logical expression to obtain a corresponding at least one logical value.
Claim 18
18[A] The system of claim 17, wherein said sensed animal information comprises sensed physiological information of said animal,
18[B] and wherein said animal information stored in said database comprises health information associated with said animal,
18[C] and wherein as to a selected period of time said at least one logical value indicates occurrence of an illness of said animal associated with said animal identification information.
Claim 19
19[A] The system of claim 18, wherein said animal identification information further comprises said animal identification information correspondingly received from a plurality of RFID devices implanted in a plurality of animals,
19[B] and wherein said sensed animal information comprises said sensed animal information receive from said plurality of RFID devices implanted in said plurality of animals,
19[C] and wherein said logical value indicates a number of occurrences of said illness in a plurality of animals.
Claim 20
The system of claim 19, wherein said logical value indicates occurrence of a greater than a pre-selected number of said illness in said plurality of animals.

CERTIFICATE OF SERVICE

I certify that today in:

smaXtec Inc. and smaXtec Animal Care GMBH v. ST Reproductive Technologies, LLC, IPR2024-00875 (U.S. Patent 9,844,206)

I caused to be served a copy of:

Petition
Exhibits 1001-1006; 1008-1011; 1013-1036

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Patent Owner agreed to have the above-listed counsel accept electronic service of the Petition on April 30, 2024. *See* 37 CFR § 42.105(b) (“Upon agreement of the parties, service may be made electronically....”).

Dated: May 2, 2024

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