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Datasheet for the decision of 24 March 2009

Case Number: T 1437/06 - 3.2.04

Application Number: 96920821.4

Publication Number: 0903980

IPC: A01K 29/00

Language of the proceedings: EN

Title of invention:
A system and a method for monitoring the physical condition of a herd of livestock

Patentee:
ALFA LAVAL AGRI AB

Opponent:
Maasland N.V.

Headword:
Confidence interval/ALFALAVAL

Relevant legal provisions:
-

Relevant legal provisions (EPC 1973):
EPC Art. 56

Keyword:
"Inventive step (no)"

Decisions cited:
-

Catchword:
-

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Case Number: T 1437/06 **-** 3.2.04

D E C I S I O N
of the Technical Board of Appeal 3.2.04
of 24 March 2009

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Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 12 July 2006 rejecting the opposition filed against European patent No. 0903980 pursuant to Article 102(2) EPC.

Composition of the Board:

Chairman: M. Ceyte
Members: P. Petti
T. Bokor

Summary of Facts and Submissions

I. The opposition division by its decision dated 12 July 2006 rejected the opposition filed against the European patent No. 903 980.

Independent claim 1 of the granted patent reads as follows:

"1. A system for monitoring the physical condition of a herd of livestock comprising:
a measurement device (15, 16, 16, 19, 20) for measuring a value of at least one property associated with an individual, identified animal of the herd,
an identification structure (20) for identifying individual animals of said herd,
a data processing structure (21) operatively connected to said measurement device (15, 16, 18, 19, 20) and to said identification structure (20), and
a signalling device (22) for generating attention signals connected to said data processing structure (21),

said data processing structure being programmed for:

- collecting measurement data in accordance with measured values of said at least one property associated with each individual, identified animal,
- determining a prediction with a permissible deviation for at least one subsequent measured

value of said at least one property for said individual, identified animal from said stored measurement data associated to said individual, identified animal,

- measuring a value of at least one property at regular intervals from each individual, identified animal,
- comparing measured values with corresponding predicted values and said permissible deviations, and
- activating the signalling device (22) to generate an attention signal each time in response to an error between the value of said at least one measured property and the prediction for that value larger than said permissible deviation,

characterized in that,

said data processing structure is further programmed for:

- collecting error data in accordance with previously measured and predicted values of said at least one property associated with each individual, identified animal,
- determining said permissible deviation in the form of a confidence interval for said prediction for each individual, identified animal from said error data,
- comparing said measured values with said corresponding predicted values and said confidence intervals (step 28), and
- carrying out said generation of said attention signal in response to an error between the measured value of said at least one measured

property and said prediction for said value above a level determined by said confidence interval."

II. The opponent (hereinafter appellant) lodged an appeal against this decision on 14 September 2006 and simultaneously paid the appeal fee. A statement setting out the grounds of appeal was received on 13 November 2006.

III. Oral proceedings took place on 24 March 2009 before the board of appeal.

IV. The appellant requested that the decision under appeal be set aside and the patent be revoked.

The respondent (patent proprietor) requested that the appeal be dismissed.

V. The appellant essentially submitted in writing that the subject-matter of granted claim 1 did not involve an inventive step having regard to EP-A-657 098 (D1) and *"Modelling Daily Milk Yield in Holstein Cows Using Time Series Analysis"*, by U. A. Deluyker et al., in *Journal of Dairy Science*, 1990, pages 539 to 548 (D2) and common general knowledge.

VI. The respondent submitted that the skilled person starting from D1 as closest prior art and combining it with D2 would not arrive at the subject-matter of claim 1 essentially because

(a) document D1 discloses the feature of determining a permissible deviation for a group of animals and not for each individual animal;

(b) in granted claim 1, the feature "collecting error data in accordance with measured and predicted values of each individual animal" means that the error data are grouped together in order to calculate a confidence interval, while D1 only discloses the determination of the error, i.e. of the deviation, in order to compare it with the maximum permissible deviation, without disclosing a collection of error data;

(c) document D2 suggests the use of a confidence interval only as a measure of the accuracy of models proposed to determine a prediction and, thus, the skilled person would not find in D2 any hint to use a confidence interval as a permissible deviation.

Reasons for the Decision

1. The appeal is admissible.

2. Inventive step

2.1 Document D1 discloses (see particularly the Figure) a system for monitoring the physical condition of a herd of livestock comprising a measurement device (sensors 27) for measuring a value of at least one property (i.e. the milk yield) associated with an individual, identified animal of the herd; an identification structure (20, 21) for identifying individual animals of said herd, a data processing structure (23) operatively connected to said measurement device and to

said identification structure, a signalling device (30) for generating attention signals connected to said data processing structure, said data processing structure being programmed for collecting measurement data in accordance with measured values of said at least one property associated with an individual, identified animal of the herd, determining a prediction ("expected value") with a permissible deviation for at least one subsequent measured value of said at least one property associated with an individual, identified animal of the herd, measuring a value of at least one property at regular intervals from each individual, identified animal, comparing measured values with corresponding predicted values and said permissible deviations, and activating the signalling device to generate an attention signal each time in response to an error between the value of said at least one property and the prediction for that value larger than said permissible deviation.

In other words, an individual animal for which the difference between the predicted value and the measured value is greater that the permissible deviation is signalled by the system. Thus, this known system makes it possible to perform further investigations concerning that individual animal in order to establish whether it is ill or not (see column 1, lines 35 to 44).

2.1.1 Moreover, according to column 5, lines 23 to 29, the processing unit 23 can determine, by means of statistical techniques, a prediction ("an expected value") for each animal which is being milked, as well as a permissible deviation from this prediction,

wherein "this expected value and this permissible deviation in combination form a milk characteristic of the animal". Furthermore, according to column 5, line 57 to column 6, line 8, the data processing structure (23) processes these data into statistical information for obtaining the milk characteristic of each animal such that "a so-called self-learning system is obtained", wherein the distribution of the data is used for determining the maximum permissible deviation. These passages implicitly disclose - particularly because the system is defined as being self-learning - that error data are collected in accordance with previously measured and predicted values of said at least one property and that the permissible deviation is automatically determined by the data processing structure for each individual animal.

2.1.2 However, although this citation refers to statistical techniques for determining a milk characteristic of each animal, it does not disclose how the permissible deviation is calculated.

2.2 The subject-matter of claim 1 differs from the prior art system of D1 essentially in that

- the data processing structure is programmed for determining the permissible deviation **in the form of a confidence interval** for the prediction for each individual animal from the error data.

2.3 The technical problem to be solved by the claimed invention may therefore be regarded as making the system for monitoring livestock for diseases known from D1 more reliable and more universally applicable.

2.4 In statistics a confidence interval is an interval which is likely to include a parameter of a population with a prescribed probability. In the context of predictions, the confidence interval is an interval having an upper and a lower limit, between which limits a future value of a property is expected to lie with a prescribed probability. The confidence interval for the prediction of a property is determined from the standard error of the previously measured values of said property.

2.5 The determination of confidence intervals, which is generally known as a statistical technique, was also used to analyze statistical models for forecasting daily milk yield, as described for instance in document D2.

This citation refers to a research carried out on 500 cows whose individual milk yield data were collected in order to monitor the performance of the cows. The objective of the study was to identify statistical models useful for short-term forecasting of milk yield using time series methods. The analysis consisted of a model identification phase, a model estimation phase and a diagnostic checking phase. In order to identify and estimate the model, different series of milk yield data were analyzed. One of the series was based upon the quantities of milk obtained from separated milkings of individual animals with the purpose of establishing a forecast for every milking; another series was based upon the total daily milk yield of the animal with the purpose of establishing daily yield forecasts.

The selected statistical model was an ARIMA (Auto Regressive Integrated Moving Average) model, in which the forecasting basis is modified after every forecast, based on the direction and the magnitude of the forecast error (see page 545: "Our model is therefore an ARIMA model ..."; page 547: "In ARIMA time series analysis, ...").

More particularly, D2 discloses an experimental system for monitoring the physical condition of a herd of livestock (see page 1, right-hand column: "... automated daily monitoring of cow performance"; "Use of automated milk yield recording systems for early detection of diseases...") comprising a measurement device for measuring a value of the milk yield of each individual, identified animal of the herd, an identification structure for identifying individual animals of said herd (see page 540, left-hand column: "Milk yield data were collected with a system for automated cow identification and milk yield recording) and a data processing structure (see page 547, right-hand column: "Implementation of the ... model on a computer") programmed for collecting measurement data in accordance with measured values of said at least one property associated with each individual, identified animal (see page 540, left-hand column: "Milk yield data were collected ..."), measuring at regular intervals a milk yield value of each individual animal, determining a prediction for at least one subsequent measured value, comparing the measured values with the corresponding predicted values, determining the prediction error for said prediction and standardizing the prediction error (i.e. calculating the variance σ^2).

Moreover, in order to compare daily yield forecasts versus every milking forecasts, a 95% confidence interval was determined from error data (namely from the standard error σ) for each animal by the formula $X_{t+1} \pm 1.96\sigma$. In this respect, D2 clearly indicates that a narrower confidence interval increases the probability in detecting production changes due to diseases (see page 546, right-hand column, 2nd and 3rd paragraphs).

Furthermore, D2 suggests the screening for forecast errors after every milking for an early detection of mastitis (page 547, left-hand column: "... screening for large forecast errors after every milking, rather than daily, might be appropriate").

Therefore, the skilled person reading D2 would immediately realize that a confidence interval for the prediction for each individual animal from the error data defines a suitable permissible deviation allowing the detection of production changes due to diseases.

Starting from D1, it would therefore be obvious for the skilled person to determine the permissible deviation in the form of a confidence interval for the prediction for each individual animal from error data collected in accordance with previously measured and predicted values of the milk yield and, consequently, to compare the measured values with the corresponding predicted values and the confidence intervals, as well as to generate the attention signal when the error between predicted and measured values is above a level determined by the confidence interval. In this way, the

skilled person would arrive at the subject-matter of claim 1 without exercising any inventive skill.

2.6 The board cannot accept the respondent's arguments referred to in section VI above for the following reasons:

(a) As explained in section 2.1.1 above, the feature of determining a permissible deviation for each individual animal is implicitly disclosed in D1. In this respect, it has to be noted that claim 1 of D1 specifies that the data processing structure "determines deviations in the data in relation to predetermined milk flow characteristics **of the relevant animal** or the relevant group of animals" (emphasis added).

(b) The terms "collecting error data" only imply the determination and the storage of error data and not the further processing of the error data. The processing of error data to determine the confidence interval is defined by the feature of "determining said permissible deviation ... from said error data". Moreover, whether D1 discloses or not "collecting error data" is irrelevant, since this feature is also known from D2 in so far as the determination of confidence intervals necessarily implies the collection of error data in order to calculate variances.

(c) As has been explained in section 2.5 above, the skilled person would immediately realize that the use of a confidence interval as referred to in D2 is a reliable method for determining a permissible

deviation. Moreover, the confidence interval referred to in D2 is a tool for assessing the significance of the error between the predicted value and the measured value. In other words, the confidence interval not only assesses the accuracy of a forecasting model with respect to the reliability of predicted values but also the significance of the measured values.

2.7 Therefore, the subject-matter of claim 1 does not involve an inventive step (Article 56 EPC 1973).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

G. Nachtigall M. Ceyte