Fertility monitor: Management tool to improve fertility and farm economics.

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Abstract

Reduced fertility is one of the major concerns in today's dairy farming. In order to give the farmer some insight in the status of the cow at the moment of insemination, technicians of CR Delta in The Netherlands are collecting three extra characteristics. Uterine tone (quality of heat), uterine discharge (hygienic circumstances) and body condition score (energy balance). All three have a proven effect on the fertility (Loeffler *et al.*, 1999; Vollema *et al.*, 2000) where bad uterine tone and uterine discharge both show a 6% lower non-return rate at 56 days.
Fertility monitor is a 1-page sheet, which on herd-level combines the three new characteristics with the well-known fertility indicators like calving interval, interval calving to 1st insemination, non-return rate at 56 days, and number of inseminations per inseminated cow. An economic indicator, presenting loss due to fertility is calculated by evaluating calving interval, number of inseminations and culling due to fertility. A knowledge based system (KBS) determines a wordly summary based on the indicators in order to help the farmer to comprehend the message. The KBS first determines if the main problem is heat detection or pregnancy rate. Secondly the two main causes for the problem are presented.
Based on a survey, 86% of the farmers was actively going to change their fertility management, varying from increasing time spent on heat detection, changing feeding or increasing hygiene at calving.

Introduction

In the Netherlands the average calving interval increased from 393 in 1992 to 414 in 2004. In that same period the non-return rate at 56 days showed only little difference, 69% in 1992 compared to 68% in 2004. The increase in calving interval was therefore mainly due a prolonged number of days to first service.
The prolonged number of days to first service is caused by a reduced and therefore shorter heat expression by the cows. In a recent study only 58% of the cows in the Netherlands show standing heat (Roelofs *et al.*, 2005), the stongest indication of heat (Van Eerdenburg *et al.*, 1996). The expression of standing heat was on average only during 5.0 hours (Roelofs *et al.*, 2005). This reduced heat expression is reinforced by the fact that due to increasing farmsize also the farmer has less time for proper heat detection.
From an economic point of view a calving interval of 1 year is still the most optimal situation in the Netherlands. This is mainly caused by a new peak in production when a cow calves. Furthermore an extra calf increases the revenues. The increased risk of calving and production diseases like (subclinical) ketosis will increase costs as well as an increased number of inseminations needed.
In order to improve fertility the objective of this study was to increase the awareness of the farmers of the economic importance of good fertility and to hand them hands-on advice about management improvements.

Method

Implementing new indicators

In order to be able to give farmers hands-on advice about management improvements the current fertility indicators like days to first service, non-return rate at 56 days and calving interval are insufficient. Therefore a number of new indicators should become available which are closely related to important management practices.
The most important influences of management on fertility are feeding or energy balance of the cows, heat detection and calving hygiene. These three factors are reflected by the status of the cow at time of insemination. Body condition score at time of insemination is a measure of energy balance, uterine tone is a measure for quality of heat detection and uterine discharge is measure of calving hygiene.
The AI-technicians of CR Delta in The Netherlands all followed a training program to score these measures. The training program consisted of 6 sessions of 3 hours with increasing intensity. These sessions were planned at six week intervals so the technicians could implement their newly gained skills for a sufficient period. An important issue in the training sessions was to get a uniform scoring over technicians. Since a farm is serviced by a number of different technicians it is important that each technicians scores in a similar way.
After the intensive training period the technicians receive every two weeks an overview of their scores of the preceding period. In this overview the scores of the specific technician are compared to his most direct colleagues. These overviews are also available to the trainer and manager who coach the technicians. When necessary a brush up training is set up for the technicians that deviate too much compared to their colleagues or the set targets.

Comprehensible product

The long-term available product to evaluate fertility performance of the farm in The Netherlands consists of almost 100 figures for different indicators, groups and/or periods. For the average farmer this large number of indicators, without any graphical presentation, doesn't clarify the fertility situation or at least doesn't bring insight in how to improve fertility. This is also confirmed by the little participation in this fertility product.
In order to develop a comprehensible product a number of conditions were set on forehand. The product must

- not exceed 1 page
- be a management overview, no detailed description
- emphasize the economic importance of herd fertility
- compare the farm with similar farms (production level, area)
- give some specific recommendations to improve fertility

Results and discussion

On average 11.4% of the cows are scored to have a bad uterine tone at first insemination. On average 5.1% of the cows have uterine discharge at first insemination. The distribution of cows for body condition score at first insemination is given in Figure 1. Figure 1 shows that more cows are present in the lower classes. This was also expected since cows are most likely near the end of the negative energy balance at time of first insemination.
Cows with a bad uterine tone as well as cows with uterine discharge both have a 6% lower non-return rate at 56 days. The effect of a bad uterine tone or uterine discharge on the non-return rate at 56 days however shows reasonable variation between

technicians. This variation gives the opportunity to further improve the scoring of these traits by the technicians.

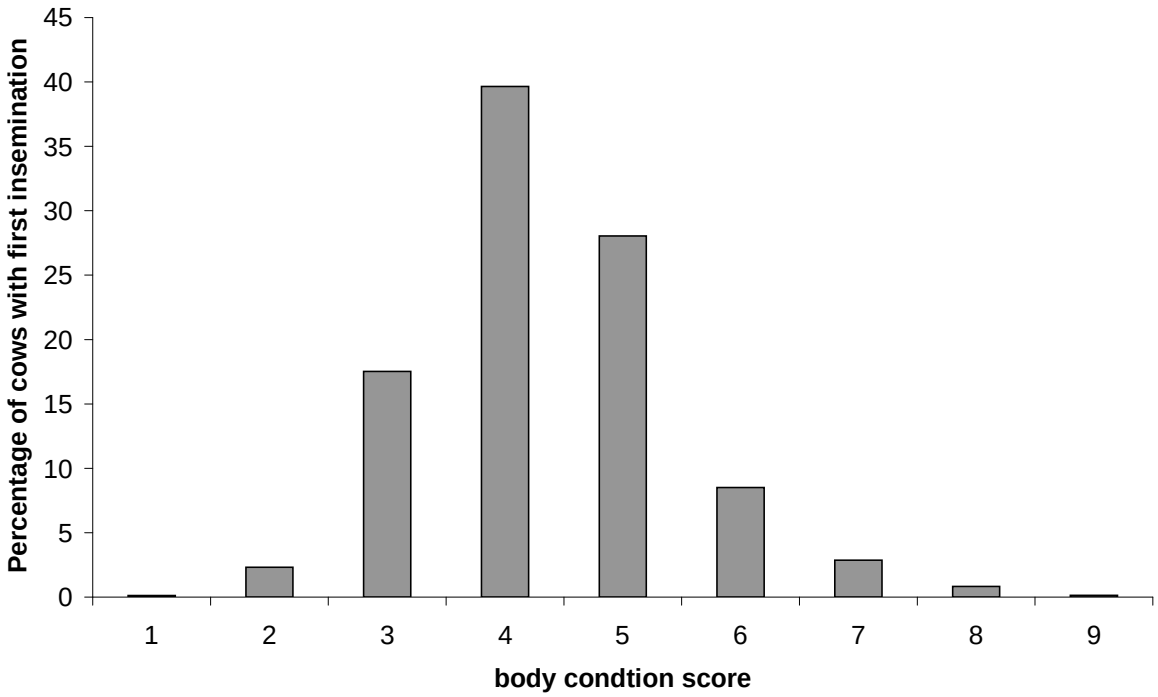

Figure 1. Distribution of cows with first insemination (n=465,794) over body condition score classes at first insemination

In Figure 2 the final product Fertility Monitor is presented. The top of the product contains besides the address and telephone number of the farm the number of cows in the herd. This helps the technician in determining the reliability of certain indicators on the product while explaining it to the farmer. Furthermore also the name and telephone number of supporting technician is given in case the farmer has some additional questions at a later stage.
With regards to content, Fertility Monitor starts with presenting the economical status of herd fertility in relation to comparable farms. This economical evaluation is presented as an index, with an average of 100 and a stand deviation of 4. This way of presenting is similar to presenting breeding values of sires in The Netherlands. After this economic evaluation Fertility Monitor gives a summary what can be concluded from the indicators on the sheet. This summary is automatically generated by a so-called Knowledge Based System (KBS). This KBS first evaluates the economic situation after which the main problem is detected by evaluating days to first service and non-return rate at 56 days. These two indicators reflect the two main problems concerning increasing calving interval, poor heat detection and failing to conceive. Finally, based on the other indicators one or two possible causes for the problem are given.
Benchmarking is done for economic loss in €/cow due to fertility (on which the index in based), four well-known primary fertility indicators, calving interval, days to first service, non-return rate at 56 days and number of inseminations per pregnancy. Also the technician scores are included in the benchmark, average body condition score, percentage of cows with body condition score of 2 and lower, bad uterine tone and uterine discharge. The average body condition score, percentage of cows with bad uterine tone and uterine discharge are also presented as trend over time.

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Vruchtbaarheidsattentie

Bedrijfsoverzicht

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Verwerkingsdatum 01/07/06 blad 1/1

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Aantal koeien: 51
Begeleider: Tonnie van den Hoeven
06-20607344

	jun '05	sep '05	dec '05	mrt '06	jun '06
Bedrijfsvruchtbaarheidsindex:	-	98	100	103	**103**

Samenvatting

De vruchtbaarheid op uw bedrijf is bovengemiddeld. Het interval afkalven-1e inseminatie is met 85 dagen goed. Aandachtspunt is de non return na 1e inseminatie (61). Deze ligt onder het gemiddelde binnen uw groep (64). Mogelijke oorzaken: (BAARMOEDER)ONTSTEKING. Dit blijkt, net als de vorige keer, uit het percentage koeien 'niet schoon'.

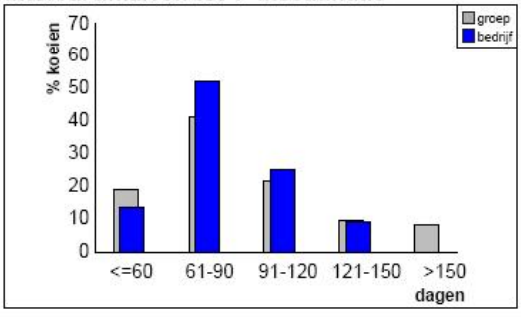
Bedrijfsvergelijking (CR Delta Oost - Achterhoek; 7500 tot 9000 kg melk)

		bedrijf	groep	-25%	+25%
niet behaald rendement	(€ / koe)	41	57		
verwachte tussenkalftijd	(dgn)	397	410		
interval afkalven tot 1e inseminatie	(dgn)	85	93		
non return 56 dagen na 1e ins.	(%)	61	64		
aantal inseminaties per geïnsem. koe		2.13	1.92		
gemiddelde conditiescore		2.65	2.68		
koeien met conditiescore 2 of lager	(%)	18.2	22.0		
koeien geen tonus	(%)	11.4	9.5		
koeien niet schoon	(%)	9.1	5.1		

Trends

	jun '05	sep '05	dec '05	mrt '06	jun '06
gemiddelde conditiescore	-	2.58	2.56	2.59	**2.65**
koeien geen tonus	-	28.1	29.3	16.3	**11.4**
koeien niet schoon	-	6.3	4.9	9.3	**9.1**

Interval afkalven tot 1e inseminatie



Verdeling van terugkomers

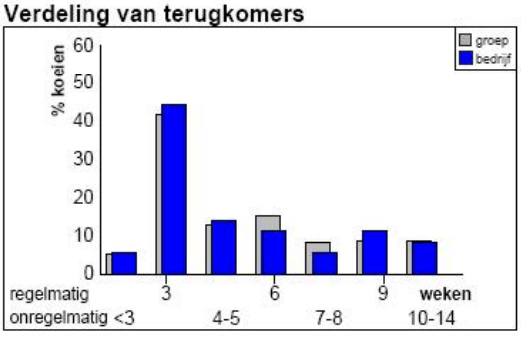


Figure 2. Fertility Monitor

Finally also some herd dynamics are presented in two graphs. The first graph represents the dynamics in days to first service. This graph shows if all cows have a somewhat prolonged number days to first service or that only a small number of cows have an extreme number of days to first service. The second graph shows the interval between 2 inseminations in the same parity. This indicates if intervals are regular at 3-, 6-, or even 9-weekly intervals and if most cows that didn't conceive are detected already at three weeks or not until 6 or 9 weeks.
Market research showed that good fertility has a high priority with the Dutch dairy farmers. The Fertility Monitor concept of identifying the problem and giving hands-on advice received a high score. Also the support given by the AI-technician was greatly appreciated by the farmers. No less than 85% of the farmers that received Fertility Monitor were going to change something in their management. Improving heat detection was the most important management measure with 43%. Also feeding strategy (26%) and hygiene around calving (12%) were frequently mentioned.

Conclusions and implications

The combination of a number of new indicators with a significant effect on non-return rate at 56 days in combination with a KBS which produces some hands-on management advice is successful in urging the farmer to take action in improving fertility. Also the supporting role of the AI-technician in explaining Fertility Monitor and giving additional advice is an extra drive.
Since April 2005 about 8,000 farmers in the Netherlands receive Fertility Monitor once every three months. Preconditions to participate are being an AI-service member of CR Delta and performing more than 30 first inseminations on cows a year. This latter precondition is to ensure the reliability of the figures presented. Since June 2006 also a copy of Fertility Monitor is made available through the Internet to the farmers veterinarian. In September 2006 Fertility Monitor is also introduced in Flanders to the AI-service members of VRV

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