

Extended lactation may improve cow health, productivity and reduce greenhouse gas emission from organic dairy cows

JESPER OVERGÅRD LEHMANN¹, LISBETH MOGENSEN^{1,2}, TROELS KRISTENSEN^{1,3}

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Abstract

The concept of extended lactation should improve cow health and productivity while reducing greenhouse gas emissions per kg milk produced in high-yield organic dairy herds. This is achieved through fewer calvings per year and hence production of fewer replacement heifers. Combined with fewer days dry per cow per year, this will reduce the annual herd requirement for feed while maintaining milk production. This means average milk yield per feeding day (i.e. days lactating plus days dry) should remain the same. Cows will produce milk for the same number of lactations, and thus cows will have longer and more productive lives. Additionally, cow health may be improved as the majority of diseases occur around calving. An on-going project at Aarhus University aims at characterising those cows that can produce milk for an extended period of time, and those cows that cannot. Finally, the project will estimate the overall herd effect of this concept on farm economy and greenhouse gas emissions.

Introduction

Extended lactation is a break with the tradition of getting one calf per cow per year, which may improve cow health, productivity and reduce greenhouse gas emission per kg milk from high-yielding organic dairy production.

Extending the time between calvings will lead to fewer calvings per cow per year and thereby reduce the number of dry days per cow per year. Fewer calvings result in fewer replacement heifers, and thus feed use for young stock is reduced. Altogether, extended lactation leads to reduced feed use without reducing milk production per cow per year. Herd level feed use is a major determinant for greenhouse gas emission per kg milk (Kristensen et al., 2011).

Furthermore, 65% of all disease incidences occur around calving (Erb et al., 1984), and hence fewer calvings per cow per year should improve animal health, which may improve longevity.

The objective of this paper is to introduce the concept of extended lactation and show preliminary results of an on-going investigation.

Material and methods

Extended lactation has been practiced by a dozen private farmers in Denmark for several years, and a number of these are certified organic. Six of these have previously been described by van Vliet (2012), and four of them have been selected to be a part of an on-going investigation – the “Reprolac” project (<http://agro.au.dk/en/research/projects/reprolac/>) – at Aarhus University in Denmark.

Three of these four private dairy farms are certified organic, and they all serve as case herds for the investigation of extended lactation as a management practice. Selected farm descriptive statistics are shown in Table 1.

Data used for analysing the effect of extended lactation were derived for each herd from the Danish cattle database. This study includes lactations where the cow had calved during 2009. Only lactations that had been completed by May 1st 2012, which means that the cow had had another calf, were included. Individual milk yields were determined over 24 hours six (herd 3, 4) and 11 (herd 1, 2) times per year, respectively.

Furthermore, the four Danish farmers practicing extended lactation were interviewed (van Vliet, 2012) about their experience with extended lactation, advantages and disadvantages,

In the on-going project, ‘Reprolac’, we will investigate the characteristics of cows that are able to produce milk for an extended period of time and those cows that are not along with the level of milk yield that these

¹Department of Agroecology, Aarhus University, Denmark, <http://agro.au.dk/en/>, eMail: jespero.lehmann@agrsci.dk

² eMail: lisbeth.mogensen@agrsci.dk

³eMail: troels.kristensen@agrsci.dk

two groups of cows can produce. Furthermore, the project aims at investigating effects on herd dynamics, farm economics and greenhouse gas emissions from the farm.

Table 1: Herd descriptive statistics of involved, private dairy farms, 2009

Herd	1	2	3	4
System	Convent.	Organic	Organic	Organic
No of annual cows ^a	162	158	112	93
Breed ^b	Holstein	Cross	Jersey	Holstein
Kg ECM / annual cow ^c	11,274	7,669	7,090	10,099
Replacement rate, %	40	42	23	25
4 th parity or older cows, %	12	19	22	13

^aAnnual cow - a cow fed for 365 days, which includes both lactation and dry period.

^bThe cross is between Jersey, Holstein and Red Danish.

^cAverage yield in kg energy corrected milk (ECM) per annual cow.

Results

Preliminary results of the Reprolac-project for calving interval (CI) and milk yield in the four herds are shown in Table 2. Mean CI varied from 14.2-17.0 months with a standard deviation of 1.5-3.5 months (43-109 days). Cows were able to produce 10,099-15,191 kg energy corrected milk (ECM) per lactation, which was equivalent to 20.8-31.3 kg ECM per feeding day. Total feeding days includes both days lactating and days dry. Milk yield at the last recording before drying off varied from 17.0-27.3 kg ECM with a standard deviation varying from 4.4-7.3 kg ECM.

Table 2: CI^a and milk yield of completed lactations in the four herds

Herd	1	2	3	4
No of completed lactations	95	94	56	37
Mean CI, months	14.2	15.4	15.9	17.0
SD ^b of CI, days	84	43	109	95
Days milking / lactation	374	422	444	466
Days dry / lactation	60	48	42	52
Kg ECM ^c / lactation	13,579	10,387	10,099	15,191
Kg ECM / feeding day ^d	31.3	22.1	20.8	29.4
Kg ECM / lactation day	36.3	24.6	22.7	32.6
Yield at drying off ^e , mean	27.3	17.0	19.5	22.0
Yield at drying off, SD	7.3	5.1	4.4	5.9

^aCalving interval

^bStandard deviation

^cEnergy corrected milk

^dFeeding day = lactation + dry period

^eLast milk recording before drying off day

In the interviews by (van Vliet (2012) one farmer noted (translated from Danish): "There is a greater chance that we will see a cow in heat, because the cow has multiple oestrus before it is inseminated". Another believes that "to start inseminating 40 days calving is way too early" and stated that: "those cows that can, will get to wait with being inseminated". Van Vliet (2012) states that "all the interviewed farmers believe that extended lactation gives several advantages, and therefore they will continue to practice it".

Discussion

Results from the Reprolac-project indicate that it is possible to extend the calving interval, which is the same trend in recent extended lactation experiments in New Zealand (Kolver et al., 2007) and Australia (Grainger et al., 2009) where the calving interval was extended as much as two years. However, not all the cows were

able to produce milk for such long periods of time. One major aim of our project is therefore to characterise those cows, which can produce milk for an extended period of time and those that cannot as this is an important aspect of extended lactation.

This concept utilises the potential of each animal to reduce feed use for unproductive animals, and thus extended lactation could play a significant role in improving resource efficiency and reducing negative impacts on the climate and environment.

Furthermore, fewer calvings per cow per year and hence fewer risk periods could improve animal health, and thus potentially increase length of a cow's life.

Suggestions to tackle with the future challenges of organic animal husbandry

A holistic approach to organic animal husbandry research is necessary for improving the sustainability of animal production. A system with extended lactation will contribute to the aim of organic farming by improving animal welfare and health, improving resource efficiency and reducing negative impacts on the climate and environment.

Our results will provide a strong decision basis for farmers to adopt this concept and adapt it to their own farm.

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