



IDF Animal Health Newsletter

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Preface

The IDF Standing Committee on Animal Health has produced the IDF Animal Health Newsletter for a third successive year. The Newsletter is available electronically and in paper copy. The primary aim of the publication is to provide the IDF community with knowledge of current activities in the field of animal health. However, it also offers a forum in which short descriptions of recent research, including PhD abstracts are made available to all members. The forum also informs members about recent work by the committee and forthcoming meetings. The majority of contributions are from members of the IDF Standing Committee on Animal Health although contributions from others are always welcome. We hope that this issue of the Animal Health Newsletter will give you a valuable insight into the activities surrounding the IDF Standing Committee on Animal Health.

If you want to contribute to the Newsletter by providing us with the results of research of interest to the dairy community as well as information on recent or forthcoming meetings do not hesitate to contact us.

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From the Chairman of IDF Standing Committee on Animal Health

Dear Reader,

IDF is a dynamic organization and the IDF Standing Committee on Animal Health of IDF (SCAH) is no exception to this rule. To keep an organization dynamic, from time to time the leadership should be changed. I am honoured that during the SCAH meeting in Mexico in October 2008 I was elected to the chair. Before going any further, I want to acknowledge the previous chairman: Laura Kulkas. Laura has had the difficult task of leading SCAH during the transition from an IDF mastitis working group to an IDF standing committee with a broader scope, in which cattle diseases affecting the dairy industry in one way or another are central. Furthermore, the SCAH is also active in the field of animal welfare. She has succeeded very well in doing so and thanks to Laura SCAH is a visible and viable IDF standing committee.

Now that the transformation of a single disease working group towards a broadly orientated standing committee is finished, I see it as my task to strengthen the SCAH in this respect. I am happy with the collaboration between IDF and the World Animal Health Organisation (OIE), the Food and Agriculture Organization of the UN (FAO) and the European Union (EU). This collaboration is clearly visible in the organization and programme of the Animal Health and Animal Welfare session during the IDF World Dairy Summit in Berlin (September 2009).

IDF is a knowledge organization and wants to provide scientific expertise and knowledge. The people sharing their knowledge and time with IDF are volunteers. The knowledge they provide to the dairy community worldwide is priceless. I see it as my task to provide the members of SCAH with a platform that will encourage experts to discuss and share their knowledge so that IDF can keep providing the dairy community the quantity and quality of knowledge it has grown used to. This means IDF SCAH meetings should be challenging, interesting and fun to attend. If possible the group of experts should grow. I am therefore very happy that during our last meeting, kindly hosted by OIE in Paris, we could welcome a number of new members, who were active from the start of the meeting. I hope that in the future we can welcome more active members from around the world.

This Animal Health Newsletter represents the broad nature of SCAH activity very well. With contributions informing you about the activities within SCAH, but also with contributions bringing you recent developments on animal health, reports on what is happening in other forums and summaries of recent PhD theses. I want to thank the editors, Ylva Persson and Elizabeth Berry and all contributors for their time and input.

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FAO web portal “Gateway to Farm Animal Welfare” in collaboration with IDF

Global livestock production accounts for 40 percent of the value of world agricultural output and products of animal origin provide one-third of humanity’s protein intake. Animals also contribute income, social status and security to roughly one billion people, including many of the world’s poor. FAO has launched its latest initiative as animal welfare has moved into the spotlight of public attention at a time of rapidly growing world demand for animal protein connected with a number of challenges in the field of production.

IDF was amongst the first FAO partner organizations representing the livestock sector to be approached with a request to join the initiative. Besides animal welfare aspects related to transport, slaughter and pre-slaughter management, the portal also focuses on issues of key importance and concern to the dairy sector connected with animal husbandry and handling and the culling of animals for disease control. The respective IDF reference documents

pertaining to animal welfare, including the IDF Guide to Animal Welfare in Dairy Production in different languages, are promoted through the FAO portal as important sector-specific literature sources for animal welfare in various milk production scenarios.

FAO and its partners joined forces to create a unique portal to assist in improving livestock welfare, health and productivity worldwide and to promote compliance with animal welfare standards, including the internationally recognized OIE standards pertaining to international trade for which IDF, through its specific expertise in various milk production systems, has become official collaboration partner of the OIE.

The portal serves as a comprehensive information database displaying publications, standards, legislation, guides, newsletters, training materials, policy and strategy documents, announcements of topic-related events etc in a structured way - all

related to animal welfare - as a one-stop-shop for individuals and organizations searching for the latest information about the welfare of livestock.

An editorial board, composed of representatives of different organizations involved, including the IDF Technical Director, has been appointed in order to preserve the integrity of the FAO web portal as source of reliable science-based information on legislation and research findings in the livestock sector, as well as on animal welfare standards, practices and policies. Expected users are farmers and government officials, lawmakers, researchers, the livestock and food industry and non-governmental organizations.

To access the portal, click on: <http://www.fao.org/ag/againfo/programmes/animal-welfare/en/>

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Animal Production and Health Division

Gateway to Farm Animal Welfare

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TO SUBMIT INFO

ABOUT THE GATEWAY

- What is the Gateway

A single access point for a wide range of information related to the welfare of farm animals. A participatory platform to retrieve and submit information, as well as to engage in commonly developed projects and thematic discussions.

WHAT'S NEW

SCIENTIFIC AND TECHNICAL PAPERS

Stress Indicators to Pre-Slaughter Transportation of Broiler Chickens Fed Diets Supplemented with a Synbiotic
There is a growing interest concerning the welfare problems associated with harvesting,...
K. Ghareeb and J. Böhm

SEARCH

Click here to use the Search option

UPCOMING EVENTS

30 Aug > 03 Sep 2009
VII World Congress on Alternatives & Animal Use in the Life Sciences

03 Sep > 04 Sep 2009
Fifth IMS World Pork Conference

21 Sep > 22 Sep 2009
Africa Animal Welfare Workshop

[\[more events...\]](#)

LATEST NEWS

17 Aug 2009 > NZ
Government Urged To Ban Live Sheep Exports

11 Aug 2009 > Australian
camels facing slaughter

Ongoing work in the Standing Committee

Antimicrobial resistance

A comprehensive review of the scientific literature by the IDF SCAH demonstrated no apparent emergence or progression of antimicrobial resistance in mastitis pathogens after four decades of antimicrobial drug use in dairy cows. Empirical scientific trials that have compared antimicrobial resistance of bacteria isolated during different chronological periods have demonstrated similar patterns of resistance today as those recorded over the last 30 years. However, isolated reports of resistant strains and detection of resistance genes in bacteria found associated with dairy cattle and dairy products amplify the need for prudent and vigilant oversight of management conditions. The IDF SCAH will continue to monitor and report new research results, in connotation with historical data, in order to alert the dairy industry to confirmed

changes in antimicrobial resistance among mastitis pathogens.

Appropriate and coordinated responses to prevent and control spread of resistance by management of therapeutic regimes will be proposed if an emergence of antimicrobial resistant among mastitis pathogens is confirmed.

The emergence of antimicrobial resistance in bacteria has had profound effects on the management of therapeutic approaches to both human and veterinary diseases. Treatment and control of mastitis is the most common use of antimicrobials in dairy cows. The prudent use of antibiotics is a vital component in disease control and assuring milk quality in most successful dairy management schemes.

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Mastitis terminology

Mastitis is a painful condition. Curing it is important for the welfare of dairy cattle. Mastitis also has significant effects on milk production and milk quality. These are two reasons why the dairy sector takes mastitis so seriously. Research into its causes, the consequences, diagnosis and treatment etc. is unceasing.

Agreement on the use of specialized terminology is essential for efficient communication and IDF has been active in this field for a long time. Revising IDF's authoritative "Interpretation of Mastitis Terminology" has taken a couple of years but is now in the final phase prior to publication and the new version should appear before the year's end.

It will be published as regular Bulletin of the IDF in electronic format. At a later stage, an on-line database version may be available

with equivalent terms in other languages. The IDF Head Office will investigate providing this option and hopes to be able to report progress to SCAH in Berlin.

This work on terminology spawned a New Work Item on the worldwide use of somatic cell counts (SCC), the most frequently encountered indicator of the mastitis status of a dairy animal. The *target audience* for the work is dairy producers and their advisers, dairy processors and regulators. Purpose *Provision of information as the basis for decisions, Generic information about SCC Cell counts* are dynamic and can be measured at various levels for different purposes: quarter, cow, herd etc. *How are SCC data used?* Regulatory purposes, economic, animal welfare, diagnostic. Information could be used in the context of FAO and OIE.

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National Dairy FARM Program - *Farmers Assuring Responsible Management*SM



The National Dairy FARM Program: *Farmers Assuring Responsible Management*SM was created by the National Milk Producers Federation (NMPF) and Dairy Management, Inc. (DMI) to bolster consumer trust and confidence in the United States dairy industry and demonstrate the industry's commitment to the highest levels of animal care and quality assurance.

More now than ever, consumers want to know that dairy products are safe, wholesome and nutritious, and that animals receive the highest level of care. The National Dairy FARM ProgramSM, available to all producers, establishes an on-farm animal well-being program and third-party verification system that demonstrates that commitment. Third-party verification ensures the validity and the integrity of the program to our customers and consumers. Our industry has an excellent track record of responsible management practices - this national effort simply brings consistency and uniformity to on-farm care and provides reassurance to consumers.

At the heart of the National Dairy FARM program is a revised "Caring for Dairy Animals" manual, which is consistent

with the National Dairy Animal Well-Being Initiative launched in 2008. The manual details best management practices for a variety of animal care issues including animal health from birth to end of life, facilities/housing, nutrition, equipment/milking procedures, transportation and handling. NMPF and DMI are currently working with dairy animal care experts to update the document to reflect current practices, animal health concerns, innovations and technology.

Training materials will include CDs and DVDs for employers and employees to implement procedures and best practices on the farm, instructor CDs with lesson plans and test questions/answers, and a CD for employers who will not have a formal instructor on the farm.

A third-party program verification system will assure credibility and demonstrate effectiveness. Third-party verification protects the integrity of the program and provides quantifiable verification that producers are meeting their ethical obligations to provide appropriate care for their animals.

The Dairy FARM animal well-being program will be formally launched to the industry, customers and consumers in late 2009. On-farm evaluations of animal care best practices will begin in 2010 and third-party program verification will begin in 2011.

For information on The National Dairy FARM ProgramSM, visit:
www.nationaldairyfarm.com.

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PhD Summaries

Bio-economic modelling of bovine intramammary infections

Mastitis is considered the most frequent and costly disease in bovine dairy herds in developed countries (Halasa et al., 2007). Several studies have been published since 1990 on the economics of mastitis and mastitis control strategies. However, hardly any of these studies have discussed the consistency of results with other studies.

Halasa et al. (2007) explained the economic factors associated with mastitis, providing a framework for economic analysis. Moreover, they summarized calculations of the costs of mastitis and the costs in relation to the benefits of mastitis control strategies published since 1990 in peer-reviewed journals. The results showed a large variation in the calculated costs and benefits of mastitis and mastitis control strategies between the different studies.

Milk, fat, and protein loss due to a new subclinical mastitis case may be economically important. Therefore, Halasa et al. (2009a) estimated the loss based on test-day (TD) cow records collected over a 1-year period from 400 randomly selected Dutch dairy herds. The analysis was carried out using a random regression TD modelling approach that predicts the production of a cow at each TD based on the actual production at all previous TDs. The definition of new subclinical mastitis was based on literature and assumed a new subclinical case if SCC > 100 000 cells/ml after a TD with SCC < 50 000 cells/ml. The loss was adjusted to the dilution effect. Primiparous cows were predicted to lose 0.31 (0.25-0.37) and 0.28 (0.20-0.35) kg/d of milk at a SCC of 200 000 cells/ml, for unadjusted and adjusted SCC, respectively. For the same SCC increase, multiparous cows were predicted to lose 0.58 (0.54-0.62) and 0.50 (0.44-0.56) kg/d of milk, respectively.

Although the dynamics of transmission play an important role in the occurrence of intramammary infections (IMI), they have not been considered in previous simulation models used to estimate the cost of IMI. Halasa et al. (2009b) developed a bio-economic model that includes within-herd dynamics of pathogen-specific IMI. The model simulated *Staphylococcus*

aureus, *Streptococcus uberis*, *Streptococcus dysgalactiae*, and *Escherichia coli* IMI stochastically and estimated the cost of these IMI in bovine dairy herds in a situation with a milk quota. The annual incidence of IMI in a herd with 100 dairy cows caused for instance by *Staph. aureus* varied between 0 and 88 cases. In consequence, the average total annual net costs also varied widely for *Staph. aureus* IMI. Clinical IMI costs were € 1375 per herd, with the 5th and 95th percentiles of 0 to 4716 and subclinical IMI costs were € 1219 per herd, with the 5th and 95th percentiles of 0 to 4030. The average annual net cost due to the 4 simulated pathogens combined was € 4896 and varied from € 915 to € 11 287 per herd of 100 dairy cows.

The goals of dry cow therapy (DCT) are to cure existing IMI at dry off and to prevent new IMI during the dry period (DP). Several studies have examined the efficacy of DCT to prevent and/or cure IMI during the DP. However, large variation existed between the different studies, which makes it hard to conduct comprehensive economic analysis on the efficacy of DCT. Therefore, 2 meta-analysis studies have been conducted. The first (Halasa et al., 2009c) estimated the preventive efficacy of blanket DCT (BDCT), and other strategies against new IMI during the DP. BDCT showed significant protection against new IMI caused by *Streptococcus* spp., the pooled relative risk (RR) was 0.39 (0.30-0.51), but no protection was observed against coliform new IMI; the pooled RR was 0.95 (0.81-1.10). After correction for publication bias, protection against new *Staphylococcus* spp. IMI was doubtful. The second meta-analysis (Halasa et al., 2009d) estimated the cure efficacy of BDCT and other strategies. BDCT provided a 1.78 (1.51-2.10) times higher calculated cure rate from quarter IMI, during the DP up to 21 days post-calving, compared to no DCT. The RR of cure was similar when treatment was conducted for *Streptococcus* spp. IMI quarters compared to *Staphylococcus* spp. IMI quarters.

Despite the great importance of the DP in affecting the udder health of dairy cattle, less attention has been given to modelling the dynamics of IMI during the DP and to estimate the subsequent cost-effectiveness of DP control strategies. The stochastic bio-economic model of IMI developed (Halasa et al. 2009b) was extended to model the dynamics of IMI during the DP (Halasa

et al., 2009e). The extended model was used to calculate the costs and benefits of different DP control strategies based on the 2 meta-analysis studies. The results showed that a considerable number of cows acquire new IMI during the dry period and start the lactation with IMI. Furthermore, the total annual net cost of IMI per herd of 100 dairy cows using BDCT was € 8336. Application of BDCT combined with TS resulted in € 967 higher total annual net cost of IMI compared to the BDCT scenario. SDCT scenario resulted in higher total annual net cost of IMI compared to the BDCT scenario.

The bio-economic model can be a good tool to examine the efficacy of several IMI control strategies during lactation.

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Economic impact of mastitis

Mastitis is often considered the most costly disease in dairy production in developed countries. The disease has several negative effects on production, such as reduced production, veterinary costs, and increased replacement rate, and mastitis control is therefore of paramount importance. Mastitis control is, however, associated with extra costs for the farmer, and interventions can be economically justified only if the resulting increase in revenue is expected to offset the incurred costs.

The economic loss associated with mastitis has recently been the topic of a PhD thesis at the Swedish University of Agricultural Sciences. Stochastic simulation was used to investigate the impact of mastitis on technical and economic results of a 150-cow dairy herd. The yearly avoidable cost of mastitis, assuming that the initial incidence (32 and 33 cases of clinical and subclinical mastitis per 100 cow-years, respectively) could be reduced by 50%, was estimated at € 8095. This figure corresponded to 5% of the economic net return for the herd given the initial incidence of mastitis. The avoidable cost of mastitis was estimated at € 54, expressed as an average. The economic loss could not be reduced by discarding milk with high somatic cell count, because this procedure resulted in a substantially decreased volume of milk sold which was not offset by the higher milk price obtained.

Cases of clinical and subclinical mastitis were, on average, associated with an economic loss of € 275 and € 60 per cow/year, respectively. Reduced milk production constituted the major cost component.

The magnitude of the yield loss associated with mastitis occurring in different stages of lactation was assessed using mixed linear models. The dataset was collected in a research herd between 1987 and 2004 and consisted of weekly test-day records sampled in 1200 lactations of Swedish Holstein and Swedish Red cows. Yield loss was most extensive when clinical mastitis developed in early lactation and when subclinical mastitis (modelled by means of increased somatic cell count) occurred in late lactation. The 305-day yield loss associated with clinical mastitis was estimated at up to 705 kg and 902 kg of milk in primiparous cows and multiparous cows, respectively, depending on lactation week at onset (Figure 1). Most cases of clinical mastitis developed in the first week of lactation and resulted in a yield loss of 578 kg and 782 kg of milk in primiparous and multiparous cows, respectively.

Daily yield loss at a somatic cell count of 500 000 cells/ml ranged from 0.7 kg to 2.0 kg of milk in primiparous cows and from 1.1 kg to 3.7 kg of milk in multiparous cows. The yield loss in an *average* 305-day lactation affected by subclinical mastitis was estimated at 150 kg and 450 kg of milk in primiparous and multiparous cows, respectively.

Considering that most cows in a herd are of second or later parities, and that the incidence of clinical mastitis and the proportion of test days with increased somatic cell count is highest in multiparous cows, the greater part of the production loss caused by mastitis is likely to be experienced by multiparous cows. Special emphasis should therefore be put on reducing the incidence of mastitis in multiparous cows. This can be attempted by enhanced mastitis control in primiparous cows, because cows that have suffered from mastitis are more likely to develop subsequent cases. Attention should be paid to cows in early and late stages of lactation. During these periods, the incidence of mastitis is highest and yield losses are the most severe, but by taking proper actions unnecessary milk loss can be avoided. High-yielding cows should be given priority, because they are at increased risk of developing clinical mastitis.

The substantial economic loss associated with mastitis is a powerful incentive to improve the udder health of dairy cows, encouraging farmers to put effort into mastitis control. This will not only increase the economic efficiency of dairy herds; it will also improve the welfare of dairy cows.

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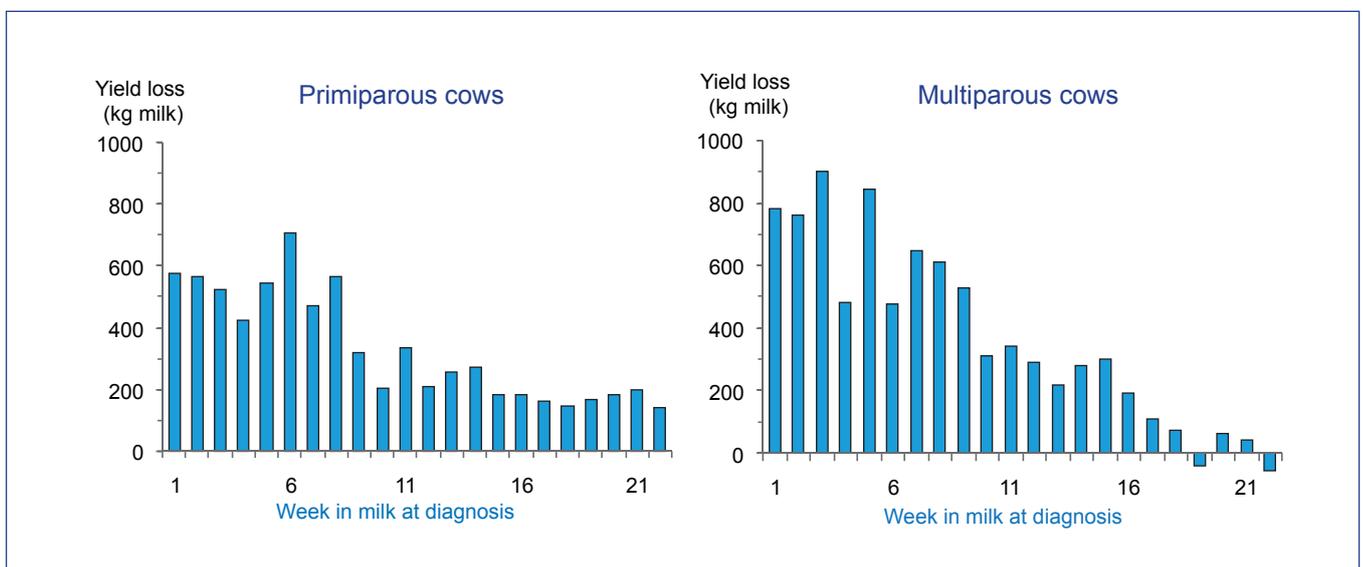
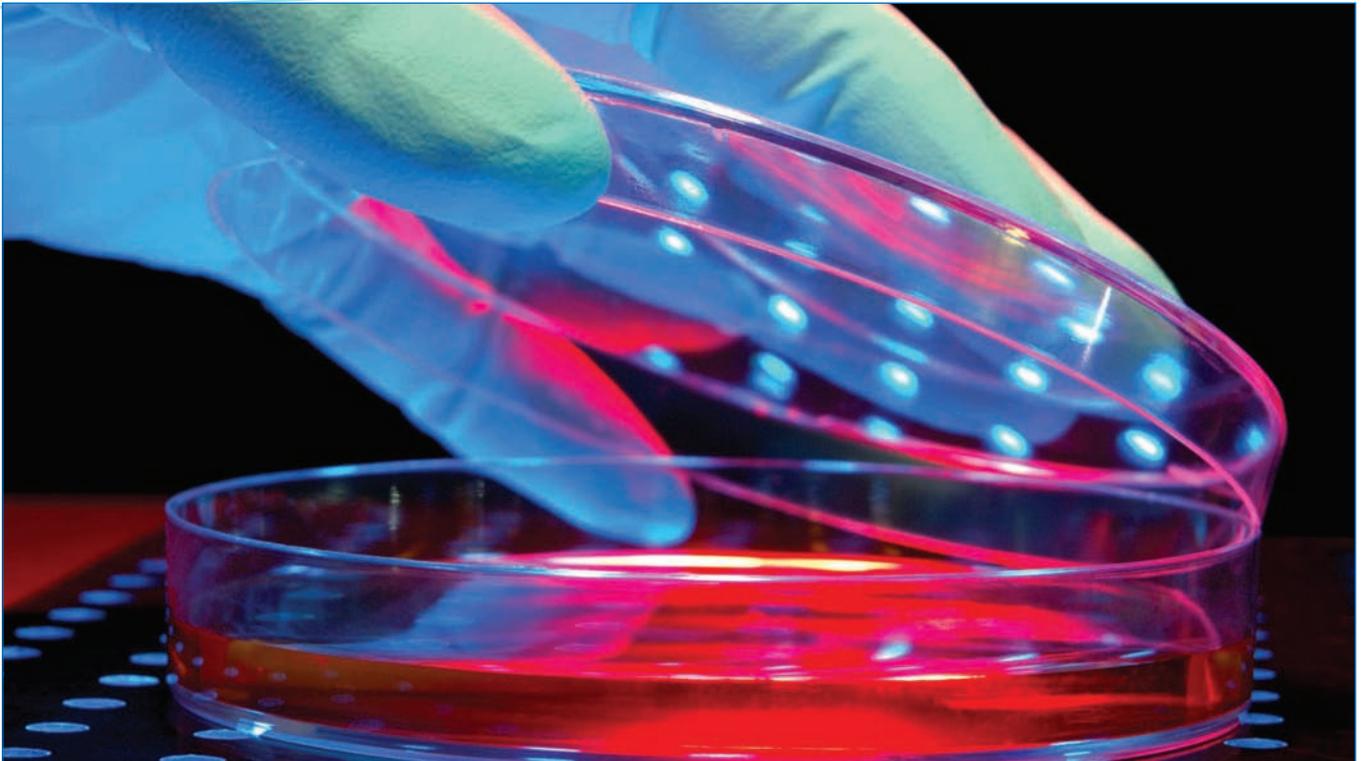


Figure 1. Proportional change in 305-day milk yield in primiparous and multiparous cows diagnosed with clinical mastitis in different weeks of lactation, expressed relative to milk yield of non-mastitic cows.

Diagnostic and epidemiological studies of staphylococci in bovine mastitis



Mastitis is the most common disease among dairy cows and is often caused by staphylococcal infections. The genus *Staphylococcus* is divided in coagulase negative (CNS) and coagulase positive (CPS) staphylococci. The CPS *S. aureus* is the most prevalent udder pathogen in Swedish dairy cows. For successful mastitis control accurate diagnostics and good understanding of bacterial epidemiology are essential. This thesis describes methods for differentiation of different CNS and CPS species, examines genotypic diversity among *S. aureus* isolates within Sweden and identifies potential sources of *S. aureus* in herds with mastitis problems.

Differentiation of CPS species

The first study found that three phenotypic tests (P-agar with acriflavin, β -galactosidase and haemolytic reaction in chocolate agar) of eight tested were useful for differentiation between *S. aureus*, *S. hyicus* and *S. intermedius* which are three CPS species of interest in mastitis. The proportions of these species among bovine milk CPS isolates tested were 97%, 1%, and 2%, respectively.

Identification of CNS species

In the second study, a phenotypic method, Staph-Zym™, was compared with a genotypic method, sequencing of a part of the *tuf* gene, for identification of CNS species isolated from cases of clinical mastitis. Staph-Zym™ correctly identified 61% of the milk isolates, but gave an incorrect species name in 28% of the isolates. When Staph-Zym™ was used it was often necessary to perform extra phenotypic tests in addition to those included in the kit itself.

Genotypic diversity among *S. aureus*

In the next study, milk isolates of *S. aureus* collected in a national survey on acute clinical mastitis were genotyped using pulsed field gel electrophoresis (PFGE). A total of 25 pulsotypes were identified. Three of the pulsotypes predominated, accounting for 50% of the isolates, and were found all over Sweden. The distribution of pulsotypes in three geographical regions of the country was compared and the results indicated that the distribution in the southern region was different from that in the northern and middle regions.

Sources of *S. aureus*

In the last study, PFGE was used to compare *S. aureus* isolates from milk samples, samples of different body sites of animals in different age groups, and samples of the environment of these animals, in five herds with *S. aureus* mastitis problems. Herd differences were found, but all herds had one predominant unique milk pulsotype. In three of the herds this pulsotype was often found in body and environment samples from lactating cows, and sometimes also in samples from other animal groups such as heifer calves. Among body samples it was most common to find *S. aureus* in hock skin samples, especially if skin lesions were present.

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Other Research

Estimating the impact of bluetongue (BTV8) infection on dairy cattle on milk production and quality under european conditions



Bluetongue (BTV8) appears unpredictably in Northern Europe in 2006. Even if its impact on sheep was well documented in the past, its effect on cattle and especially in dairy cattle was poorly described.

To assess the impact of the Bluetongue epizootic in dairy cattle, three different methods have been developed: analysis of national databases, a field survey in infected farms (North-east France), and estimation of economic consequences.

The national database results showed a variability in mortality rate (0-16.5%). Newborn calves fatality was 22% higher in infected farms than in infection-free farms. In adult cattle this risk was also higher (+35%). On the basis of a field investigation, case fatality was about 3.7%

in cows and 12.5% in calves. Morbidity rate varied markedly among herds (0 to 100%), even if it was more substantial in adults. With regard to milk yield, results showed a temporary decrease in 69% of farms. In infected cows, it was estimated from 8 to 60% during the 2 or 3 week period following infection before returning progressively to normal. At herd level, 22% of farmers confirmed a decrease in milk production of about 11% comparing to the previous year but it was difficult to attribute this uniquely to an effect of BTV. At national level, this effect was not significant. In addition to these direct effects, some consequences like reproduction, trade restrictions, and more labour etc were difficult to quantify. Globally, economic effects resulted in a decrease of the gross margin between 1%

and 8%.

Concerning milk quality (SCC, protein...), the results did not indicate a significant impact on mean SCC at herd level and protein level remained around 31-33g/l. This might be explained by lack of individual cow data.

This study showed through several approaches that BTV infection has a significant impact on dairy farms. However, those preliminary results should be complemented to assess the effects on milk quality more specifically.

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The economic consequences of foot disorders in dairy cattle¹

Both from an economic and welfare point of view, foot disorders are an important health problem in dairy cattle. Foot disorders and the resulting lameness cause serious economic losses for the farmer. This is because of the incidence, severity and duration of foot disorders. Prevalence of both subclinical and clinical foot disorders is high.

The objective of this research was to estimate the economic consequences of foot disorders, both clinical (lameness) and subclinical (only detectable during clinical inspection), in dairy cattle by using a dynamic stochastic Monte Carlo simulation model. Economic consequences of foot disorders which were modelled were milk production losses, culling, prolonged calving interval, dairy farmer labour, foot trimmer costs, veterinarian visits and the costs of drugs and discarded milk. The following foot disorders were modeled: Interdigital Phlegmon (IP), Sole Ulcer (SUL), Sole Haemorrhage (SH), Interdigital

Dermatitis and Heel Horn Erosion (IDHE), Digital Dermatitis (DD), Interdigital Hyperplasia (HYP) and White line disease (WLD).

Based on existing literature and expertise, a default situation for Dutch circumstances has been modelled. Incidence of clinical and subclinical foot disorders, including the duration of these disorders are given in Table 1. Digital dermatitis was the disorder with the highest clinical incidence, while sole haemorrhage is the disorder with the highest subclinical incidence.

Table 1: Incidence (cases/100 cows/year) and duration per case for the different disorders, split up in subclinical (SC) and clinical (C) cases.

		IP	SUL	SH	IDHE	DD	HYP	WLD
Incidence (cases)	Subclinical	-	-	54	37	27	5	9
	Clinical	6	9	7	7	20	2	3
Duration (months)	Subclinical	-	-	4.43	4.28	3.65	4.27	4.43
	Clinical	1.02	2.50	3.38	3.40	3.54	4.01	2.90

Table 2: Economic consequences (€/year) of subclinical and clinical foot disorders.

	Subclinical	Clinical	Total
Costs milk production losses	864	673	1 537
Costs culling	0	769	769
Costs prolonged calving interval	243	175	418
Costs extra labor dairy farmer	0	410	410
Costs extra visit foot trimmer	0	105	105
Costs extra visit veterinarian	0	53	53
Costs drugs	0	48	48
Costs for discarded milk	0	135	135
Total costs	1 107	2 367	3 474

In Dutch circumstances with a milk quota system the costs due to foot disorders for a default farm with 65 cows is € 3474 (Table 2), varying from € 2282 to € 4965. This means a loss of € 53 per cow in the herd. Milk production losses and culling are the most important cost factors. The costs of subclinical foot disorders make up 32% of the total costs due to foot disorders. Moreover, a large proportion of the costs due to clinical foot disorders are made up by indirect cost factors such as milk production losses, prolonged calving interval and discarded milk. Digital dermatitis is the disorder with the highest contribution to the total costs

(data not shown). This is because of the high incidence in combination with a long duration.

These calculations are, of course, for a default farm. For each individual farmer, the costs due to foot disorders can, and most probably will, be different. Farm-specific calculations are necessary to get a good estimate for an individual farmer. Moreover, not all costs are preventable. A zero incidence of foot disorders is impossible. However, these results can be used to create awareness among dairy farmers and their (veterinary) advisors. This awareness is a starting point for further

action in improving the health and welfare of dairy cattle.

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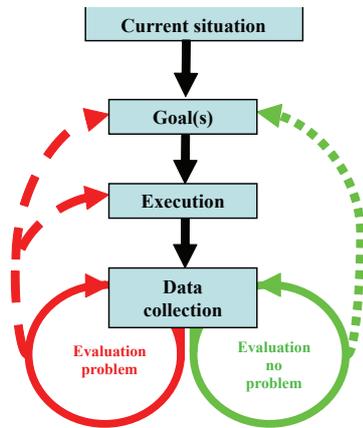
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¹ This contribution is based on a scientific paper by the same authors entitled *Assessing the economic consequences of foot disorders in dairy cattle using a dynamic stochastic simulation model*, which has been submitted for publication.

Costs and effects of mastitis management measures

To reduce the incidence of mastitis, many different management measures are available. The first step in deciding which management measure will be best to implement on a farm should be evaluation of the current situation of the farm.



Next to the more “standard” aspects included in this evaluation, like bulk tank somatic cell count (BTSCC), incidence

of clinical mastitis, % of newly infected animals, the current costs of mastitis are also an important aspect to take into account. When setting goals based on the current situation it becomes clear what the scope is for investment when the current costs for mastitis are known. Next to setting the goal, for example to reduce the costs of mastitis, it is important to have an overview of the measures available and the effects of these measures on the farm situation.

Currently, management measures are often advised intuitively and there is a lack of consistent information about the effects of different management measures under different farm situations. Table 1 presents an overview of the effects of 18 important mastitis management measures on the incidence of clinical mastitis and Table 2 the effects on BTSCC. These effects are based on available literature from 1986 onwards, and the authors’ expertise. In total 436 papers were selected from literature of which 175 were deleted because they were irrelevant (for example, because the paper did not describe original research, none of the selected management measures was included in the paper, or the research described in the paper was not applicable to the Dutch situation). Moreover, many

papers were excluded because values could not be recalculated to a percentage decrease of clinical cases and/or BTSCC. Finally, 43 papers were included as input. Expertise was collected by means of a questionnaire in which experts were asked to give minimum, most likely, and maximum values of the efficiency of the different management measures for a 100% environmental mastitis problem or a 100% contagious mastitis problem. They were asked to specify these effects on BTSCC and on the % of clinical cases separately.

On average, post milking teat disinfection has the greatest effects on decrease in clinical cases and BTSCC for both environmental and contagious problems. For the other management measures, a larger variation can be seen for the effects on clinical cases and BTSCC and for environmental and contagious problems. Next, all management measures have quite a large variation around the most likely value. This is an indication that the effects can be different for different farms and situations, but it can also be a result of lack of knowledge among the experts. It is important to take this variation into account when supporting decisions.

Table 1: Effects (in % decrease) of 18 important mastitis management measures on the incidence of clinical mastitis.

Management measure	Effect on incidence of CM			
	Environmental		Contagious	
	MI (ranking)	Min ; Max	MI (ranking)	Min ; Max
Milking clinical cases last	4.75 (15)	3.11 ; 6.58	9.56 (7)	6.98 ; 12.50
Milking subclinical cases last	2.63 (17)	1.52 ; 4.25	12.08 (5)	8.17 ; 16.58
Separate cloth	6.08 (10)	3.21 ; 8.96	9.61 (6)	5.59 ; 13.84
Wash dirty udders	6.68 (9)	4.50 ; 9.03	4.60 (15)	3.11 ; 5.93
Prestripping	2.99 (16)	1.68 ; 4.35	2.94 (17)	1.61 ; 4.38
Milkers’ gloves	0.26 (18)	1.68 ; 4.35	1.81 (18)	-8.59 ; 8.66
Post milking teat disinfection	36.51 (1)	31.97 ; 39.23	37.15 (1)	32.44 ; 40.08
Flushing clusters clinical	5.03 (12)	1.05 ; 8.72	8.55 (9)	1.90 ; 14.25
Flushing clusters subclinical	5.03 (12)	1.05 ; 8.72	8.55 (9)	1.90 ; 14.25
Replace teat liners	6.03 (11)	3.69 ; 8.44	7.82 (11)	5.68 ; 9.68
Treatment protocol	5.03 (12)	2.56 ; 7.81	6.02 (12)	3.53 ; 8.77
Drying off	11.75 (5)	7.41 ; 16.28	14.02 (4)	8.94 ; 19.72
Keep cows standing	9.47 (7)	5.94 ; 13.19	5.18 (14)	2.94 ; 7.47
Dry cow minerals	14.98 (3)	11.19 ; 18.90	14.27 (3)	10.87 ; 17.98
Prevent overcrowding	12.06 (4)	7.98 ; 16.25	8.75 (8)	5.59 ; 12.10
Clean stalls	11.57 (6)	7.94 ; 15.42	5.55 (13)	3.04 ; 8.40
Clean yards	8.17 (8)	4.84 ; 11.76	4.28 (16)	2.25 ; 6.58
Optimize feed	17.00 (2)	12.44 ; 21.73	16.48 (2)	12.27 ; 20.82

Table 2: Effects (in % decrease) of 18 important mastitis management measures on BTSCC.

Management measure	Effect on BTSCC			
	Environmental		Contagious	
	MI (ranking)	Min ; Max	MI (ranking)	Min ; Max
Milking clinical cases last	14.37 (5)	12.78 ; 15.91	17.46 (5)	15.81 ; 19.05
Milking subclinical cases last	20.91 (2)	18.31 ; 24.53	25.98 (2)	23.91 ; 27.80
Separate cloth	2.63 (18)	1.58 ; 3.66	5.45 (15)	4.10 ; 6.81
Wash dirty udders	5.94 (16)	5.55 ; 6.32	5.32 (16)	4.93 ; 5.73
Prestripping	13.62 (6)	12.32 ; 14.94	14.09 (7)	12.42 ; 15.80
Milkers' gloves	3.19 (17)	1.75 ; 4.45	6.21 (14)	4.67 ; 7.68
Post milking teat disinfection	33.84 (1)	33.03 ; 34.68	36.16 (1)	33.56 ; 40.27
Flushing clusters clinical	7.91 (12)	5.47 ; 10.28	12.81 (8)	9.80 ; 15.84
Flushing clusters subclinical	7.91 (12)	5.47 ; 10.28	12.81 (8)	9.80 ; 15.84
Replace teat liners	7.81 (14)	5.84 ; 9.57	8.09 (12)	5.35 ; 10.80
Treatment protocol	8.01 (11)	4.03 ; 12.18	9.92 (10)	6.28 ; 13.42
Drying off	18.69 (4)	13.50 ; 23.76	21.10 (3)	15.34 ; 26.83
Keep cows standing	7.01 (15)	4.75 ; 9.20	4.34 (17)	2.77 ; 5.75
Dry cow minerals	20.89 (3)	19.60 ; 22.21	20.18 (4)	19.16 ; 21.27
Prevent overcrowding	13.52 (8)	9.20 ; 17.31	9.87 (11)	6.46 ; 13.06
Clean stalls	12.64 (9)	8.65 ; 16.54	7.20 (13)	4.85 ; 9.57
Clean yards	8.17 (10)	5.47 ; 10.53	3.19 (18)	2.04 ; 4.34
Optimize feed	13.45 (7)	10.62 ; 16.25	14.44 (6)	11.75 ; 17.07

Economic consequences of management measures often are left out of advice and decision support, but are a very important aspect of good advice. Measures often are advised on the basis of their assumed

effect or are discouraged because of high costs, while cost-efficiency is hardly taken into account. Management measures with the greatest effects are not necessarily the ones with the best cost effectiveness. When

management measures are advised without taking their associated costs into account, the ranking of these measures will differ from the ranking when costs are taken into account.

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Scrapie

Scrapie is a fatal neurodegenerative disease of sheep and goats, known since the 18th century. It belongs to the group of transmissible spongiform encephalopathies (TSEs) that comprises also the bovine spongiform encephalopathy (BSE), the chronic wasting disease of cervids and a series of human diseases namely Creutzfeldt-Jakob diseases (CJD), Gerstmann-Sträussler-Scheinker syndrome, kuru and fatal familial insomnia. A common feature of TSEs is the accumulation, mainly in the brain, of the pathological prion protein (PrP^{Sc}=scrapie Prion Protein), an aberrant isoform of the normal host encoded cellular prion protein (PrP^C=cell Prion Protein), that leads to severe nervous damage and death.

Up to today, there is no evidence that natural transmission of the scrapie agent to

humans could occur. In contrast, in 1996, laboratory and epidemiological studies showed that oral exposure to BSE agent was the probable cause of a new form of Creutzfeldt-Jakob disease in humans, the variant CJD. Experimental transmission of BSE to sheep and goats produced clinical symptoms similar to scrapie while natural BSE transmission has reported only in two goats (Eloit et al., 2005; Dustan et al., 2008) and not in sheep. However, "fears that BSE might propagate in sheep and goats masked by scrapie, and that their carcasses or secretions could act as a secondary source of human exposure to BSE, have stimulated an European Union (EU) initiative to eradicate TSEs from small ruminants" (Hope, 2009).

In 2007 in the EU of 27 Member States, a total of 828 644 ovine and 277 196 caprine

animals were tested in the framework of the TSE monitoring program and 2253 ovine and 1272 caprine animals turned out positive. None of them has been confirmed to be BSE. In regard to the development of TSE testing from 2002 to 2007, there is still no clear trend with regard to the prevalence of TSE in tested animals in the different target groups. Prevalence in tested animals not slaughtered for human consumption seems to be higher than in healthy slaughtered sheep or goats. TSE prevalence is higher in sheep compared to goats, and Cyprus has the highest TSE prevalence in small ruminants compared to other EU Member States (European Commission, 2009).

Based to Regulation (EC) No 999/2001 and its amendments, a key element of the TSE management plan is the selective breeding

of sheep for alleles of the prion protein gene known to confer relative resistance of animals to clinical disease. Goats are still excluded from this strategy because the ARR allele, associated with enhancing resistance in sheep, is not present in the goat prion protein gene. On the other hand, there is evidence for the existence of other PrP variants in goats related to resistance (Vaccari et al., 2009) which probably could support a future selective breeding plan.

Important issues that have arisen in regard to scrapie are: the implementation efficiency of scrapie eradication plans and the presence of infectious prions in sheep milk.

Two parameters that impede the efficient eradication of scrapie are the absence of TSE diagnostic testing in live animals and the genetic variations of scrapie susceptibility in sheep. This means that, for scrapie, the health status of a flock is determined by brain testing of animals

which are no longer present in the flock and not part of the existing livestock. Moreover, a negative result obtained from a genetically susceptible animal strongly supports the evidence of a scrapie-free flock, compared with a negative result obtained from a genetically resistant animal, which most probably would not have been affected even if scrapie was present in the flock (Durand et al., 2009). Recently by incorporating epidemiological and genetic data from United Kingdom, simulation models predicted the persistence of scrapie in UK flocks for a few hundred years if no scrapie eradication plan is implemented. In contrast, the same models predict the eradication of scrapie from UK flocks in a few decades if intervention is undertaken (Truscott and Fergusson, 2009).

On the other hand, awareness of the transmission of prion diseases in small ruminants is of major importance in order to prevent their spread. Recent data demonstrate that the secretion of PrP^{Sc} in

milk occurs in animals naturally exposed to scrapie (Maddison et al., 2009; Konold et al., 2008; Lacroux et al., 2008) and its presence in milk is not necessarily dependent on PrP^{Sc} accumulation in the mammary gland or on mammary inflammation (Maddison et al., 2009; Lacroux et al., 2008; Ligios et al., 2005). “These findings do not indicate in any way the introduction of zoonotic prions from sheep into the human food chain” (Maddison et al., 2009) but these authors point out that cautious risk assessment should be done associated with animal products originating from infected sheep farms (EFSA, 2008A; 2008B). Additionally, the potential use of the serial PMCA (Protein Misfolding Cyclic Amplification) method in milk samples may offer a diagnostic tool for the identification of live infected sheep that shed the PrP^{Sc} through their milk (Maddison et al., 2009).

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Reducing the wastage in the dairy herd

Fertility in dairy cows has declined steadily over the past 40 years as average yields have increased. The average UK cow survives only three lactations, with infertility the major cause for culling. This limits the availability of replacement heifers and reduces profitability. A longer herd life yields greater profit, which is directly correlated to the number of lactations achieved in a lifetime.

This project aimed to:

- Assess culling rates and survival times in UK herds throughout the lifetime of the animal.
- Determine the influence of growth rates, management factors and genotype on fertility, milk production and survival.
- Provide advice on how best to manage heifers during the rearing period to reduce losses from involuntary culling of young animals.

The study was based on 650 dairy calves recruited at birth from 19 Holstein-Friesian dairy farms (median herd size 228, range 105-540 cows) located across southern counties of England and representing a variety of different management practices. The study was carried out over five years.

The project showed that there was an 8% calf mortality for calves born from cows, with 12% mortality for calves born of first calving heifers and 18% mortality for twins.

The main causes of death/culling were:

- <15 months - infectious disease (eg, rotavirus, pneumonia) and accidental death.
- 15-24 months – infertility as heifer.
- Older cows – infertility, calving associated problems, mastitis.

The overall average growth rate up to six months was 0.77 kg/d but this was very variable between animals (0.23-1.25 kg/d). Calves with poor early growth (first six months) were more likely to die young and less likely to conceive at 15 months. As body weight gain during the first six months of life increased, the age at first service and at calving decreased – heifers calving at <25 months of age were heavier at 1, 6 & 15 months of age.

Overall conception rates for heifers were better than those of lactating cows

(average 1.4 services/conception, range 1-6). However, a number of heifers either failed to conceive at all, or had poor fertility. This led to delayed first calving. Although most heifers calved for the first time between 22-28 months, some took much longer (up to 51 months!).

Heifers calving at 22-23 months had the best outcome in terms of good subsequent fertility over three lactations, a higher proportion of their life spent in milk production and the lowest culling rate up to five years (14%). Cows with delayed first calving (>26 months) had the worst

performance subsequently, with poor fertility and milk production and higher culling rates (55%).

The take-home message is to pay good attention to detail, to ensure that all heifers achieve an optimum growth rate of 0.7-0.8 kg/d. This will pay dividends later. The target should be for the animals to reach puberty at nine months and first breeding at 14 months. This way, more animals will reach first calving, they will survive longer, have a greater lifetime yield and be more profitable.



How can reduced losses be achieved?

Keep good records of the timing and reasons for all heifer losses on your farm for benchmarking. Improve management practices at key times to reduce losses and improve growth rates.

Around calving

- Improve observation of the calving pen to ensure that animals requiring assistance get adequate help.
- Make records of cows expecting twins so that adequate calving assistance can be given to these animals.
- Ensure that heifers have adequate body weight & frame size at first service but are not too fat at calving in order to help reduce calving problems.

During the rearing period

- Assess calf housing regularly to help reduce the risk of calf deaths resulting from injuries, accidents & infectious disease.
- Use good quality milk or milk replacer that has been prepared hygienically.
- Identify small calves at birth and monitor them closely – if necessary put back a group.
- Identify freemartins at birth to reduce unnecessary rearing costs.
- Ensure that calves have adequate weight and feed intakes prior to weaning. Wean calves based on a combination of calf weight, feed intake and age, **not** age alone – if necessary wean small calves later.
- Dehorn calves before weaning to reduce stress after weaning.

How can optimal growth be achieved?

- Monitor growth rates during the rearing period to ensure that heifers do not grow too slowly (<0.6 kg/day; delaying first calving) or too fast (>0.85 kg/day; expensive and also negatively associated with fertility).
- Set growth rate targets that will ensure all calves in a group will reach the desired weight and age at first service and at calving.
- Measure body weight (or height at withers or heart girth) at birth and again at approximately 4-6 months of age, to allow enough time before the start of breeding for corrective measures to be implemented if targets are not being met.
- Choose a time point to record heifer weight that will coincide with an essential management practice, e.g. worming or vaccination, when heifers are run through a race so that monitoring growth does not become an additional chore.
- Compare the mean growth rate of heifers with the previous year's cohort – if differences arise determine what is causing the change in growth.
- Provide supplements whilst heifers are grazing if the grass quality is poor in order to help maintain optimal growth.
- If the target growth rate is not achieved during the first 6 months of life, seek advice from your veterinary surgeon or nutritionist to determine the problems associated with suboptimal growth, e.g. nutrition, housing, infectious disease.

How can the fertility of heifers be improved?

- Suboptimal growth during the rearing period was the main reason for delaying the commencement of breeding & consequently increasing the age at first calving.
- Monitor the growth of heifers during the rearing period to ensure heifers have achieved an adequate size to be served at 15 months of age, and thus tighten the calving age to around 24 months, reducing the costly non-productive period.
- If heifers reach the start of the service period at a similar age and size, and excellent fertility management is implemented, all heifers within a cohort should approach first calving at a similar age making the nutritional management around calving easier.
- Provide good nutritional management of pregnant heifers in late gestation to help reduce the risk of fertility problems after calving – heifers should calve with a body condition score ≤ 3.0 . Fat heifers at calving will suffer from greater calving difficulty, more weight loss in early lactation and hence worse fertility.

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The key staff involved were: Prof D Claire Wathes, Prof Michael McGowan, Prof Dirk Pfeiffer, Dr Jessica Brickell and Dr Nicola Bourne.

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Future meetings and reports of past meetings

NMC Update

In a first-time partnership, NMC and the Mid-Atlantic Consortium (MAC) attracted nearly 200 individuals to the Joint NMC Regional Meeting and MAC Conference, held May 27-28, in Wilkes-Barre, Pennsylvania. Attendees represented various facets of the dairy industry and included extension educators and specialists, producers, veterinarians, consultants, equipment and pharmaceutical suppliers, technical field staff, and students.

The NMC Board of Directors also met in Pennsylvania to discuss issues and activities related to the continued success of the organization. NMC President Norm Schuring, GEA WestfaliaSurge, reviewed the outcome of the recent NMC Long Range Planning Session. The three main critical goals for the next five years are 1) Initiation, implementation and delivery of innovative knowledge, communications, and educational materials to all those interested in milk quality; 2) Continue to emphasize global growth of the organization in all areas of activity; and 3) Recruit and involve new personnel entering the industry. Considerable discussion centered on the importance of committees to the success of implementing the critical goals and to the overall objectives of the NMC.

Under the directive of the Board, a task force is currently developing a position on the consumption of raw milk, and should have a draft statement available by the next NMC annual meeting. Other Board discussion items included a proposal to hold an NMC regional meeting outside the U.S., simultaneous translation at the upcoming NMC annual meeting, and use of new technologies for educating and networking.

The NMC 49th Annual Meeting is scheduled for January 31 – February 3, 2010 in Albuquerque, New Mexico. The program will feature a pre-conference symposium on worldwide trends affection demand for milk. Themes for the general sessions include: motivating farmers to produce high quality milk; the science of treatment; reaching the global dairy industry in developing countries; and managing environments to reduce mastitis and improve milk quality. The meeting will also feature short courses and a poster session. Information about attending and participating in the meeting will be available on the NMC website www.nmconline.org

The NMC Scholars Program, which provides travel scholarships to graduate students to attend the NMC annual meeting and

encourage their participation in NMC activities, has proven to be a success and will continue to be offered every year. The goal is to support the development of mastitis and milk quality researchers throughout the world.

As a reminder, papers presented at all of the NMC annual and regional meetings since 2001 are available in the NMC online proceedings library, which is accessible to all NMC members.

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IDF conference on Mastitis: 2010, Christchurch, New Zealand

The 5th IDF Mastitis Conference, to be held from 21st-24th March 2010 at the Christchurch Convention Centre, is the key international forum for updating and exchanging information on mastitis and milk quality. It is one of the best opportunities to network and influence the leaders in the dairy industry.

The Conference will report on innovative research and other advances in the understanding of mastitis being achieved worldwide. It will attract international mastitis leaders (academic, technical, communicators etc) to discuss progress since the 2005 meeting in Maastricht (Netherlands).

This is a major networking opportunity that those involved or interested in the industry cannot afford to miss. Delegates will include researchers as well as those from commercial and other organizations who offer technical support and solutions to dairy farmers.

Professional, technical and marketing staff from the companies on the sponsorship list will also attend, along with many from associated businesses; rural professionals such as vets; regulators and representatives of governmental and non-governmental organizations, especially international agencies.

This will be the major mastitis and milk quality research and veterinary meeting for all dairy specialists in the world in 2010. Associated with the conference there will also be New Zealand and Australian local meetings, including Dairy Cattle Vets and the biannual "SAMM" plan meeting of dairy processors and consultants.

5th IDF International Mastitis Conference
21st to 24th March 2010

Christchurch Convention Centre

For further information, check out the website: www.mastitis2010.com or contact The Conference Company

Clare Wilton
e-mail: cw@tcc.co.nz

Alcasde Project – Study on the improved methods for animal friendly production in particular on alternatives to the castration of pigs and on alternatives to the dehorning of cattle

ALCASDE is a European project with the aim of developing and promoting alternatives to the dehorning of cattle.

In a first step, a study will be carried out to analyse the state of the art of dehorning in the EU member states. The objectives are :

- To estimate how many cattle are dehorned or not, and how dehorning is practised across the European Union.
- To analyse farmers' attitudes towards dehorning practices and keeping horned animals.

During a second step, an assessment of benefits and drawbacks of dehorning and alternatives to dehorning in dairy and beef cattle will be realised based on scientific literature and data available. The main topics are :

- To summarize possible effects of dehorning on the development of the animals.
- To assess the pros and cons of current alternatives to dehorning: keeping fully horned animals and producing polled animals.

At the end of the project, an analysis of short-term and long-term strategies for future development will be realised. By associating stakeholders, this last step aims especially at finding solutions to overcome current problems or limits to alternatives to dehorning and formulate recommendations on these alternatives.

NB The stakeholder conference will take place in Bologna (provisionally), 28-29th October 2009.

<http://www.alcasde.eu/>

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