



IDF Animal Health Newsletter

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Preface

Dear reader,

In front of you, you have the sixth edition of the yearly IDF Animal Health Newsletter produced by the IDF Standing Committee on Animal Health (SCAH). The Newsletter is available both electronically and as a paper copy. The Newsletter is produced with the primary aim of providing the IDF community with knowledge of current activities in the field of animal health. It also offers a forum in which short descriptions of recent research, including summaries of PhD and master theses, are made available to all members. The contributions are from members of the IDF SCAH and their collaborators, from all over the world. 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. Nice pictures are also very welcome. This issue of the Animal Health Newsletter represents the broad nature of SCAH very well, with contributions covering from antibiotic policies and ringworm to lameness and propane flaming of sand bedding. I hope that you will find it both interesting and inspiring.

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From the Chairman of IDF Standing Committee on Animal Health (SCAH)

Future prospects for work on animal health

Dear Readers,

Another year has passed. This note from the chairman is always a great opportunity to look at the work of our standing committee from a bit of a distance: something I do with great pleasure.

Animal health has always been important. In the recent past, however, animal health was seen as a matter for the farmer and his veterinarian, and not something the dairy industry as a whole should be concerned with. Well, this is changing rapidly. Since people in general and consumers are increasingly interested in the way we produce dairy products, these issues are becoming more important, not only as an economic item (a diseased animal produces less efficiently) but also as a question of image. Dairy products are healthy and should come from healthy animals.

The importance of animal health is getting broader as well. We are not talking about the direct effects of health per se. Indirect effects, such as the possible relationship between the use of antibiotics in animals and resistant human pathogens, or the welfare effects of disease are becoming increasingly important. This widens the scope of the work of our standing committee.

In the IDF Animal Health Newsletter of last year, I wrote about a report of a Dutch NGO on the welfare of dairy cattle. The important point I wanted to make is that there is a difference between animal welfare and the *perception* of animal welfare. NGO's use perceptions a lot. During our last SCAH meeting we got reports from various countries in which NGO's are bringing dairy husbandry aspects into public view in order to mobilize the public to demand improvements in animal welfare. And although we all agree that animal welfare is important and should be improved, we should be aware that our decisions must be based on scientific fact. IDF Standing Committee on Animal Health can play a role in the gathering and presentation of these facts.

At the last meeting of the SCAH, which we held in Amersfoort, the Netherlands, we used a different set up for the meeting and that proved to be very successful. You can read more about that elsewhere in this Newsletter. I want to thank Ylva Persson again for the work she has put in editing this issue of the Animal Health Newsletter, supported by Marylene Tucci from IDF headquarters. Furthermore I want to thank the members of SCAH, especially the active ones, for the time and effort they put in serving the IDF community. If you want to share your expertise with our committee, please feel free to contact me or somebody else within IDF.

Finally a few personal words, the SCAH meeting during the World Dairy Summit in South Africa will be my last one as chair of SCAH. Four years ago, I was elected as chair of the SCAH, in a situation that I want to describe as "tense". There were two nominations for chair and an election was needed to give a decision. I am been proud that I was allowed to serve IDF as chairman of SCAH and I was happy with the trust that the members of SCAH gave me. I hope I have not betrayed that trust.

During that meeting I indicated that I wanted to get the "fun" back into the committee and its work. Being expert in an IDF standing committee is work, however, and, even worse, it is voluntary work. In order to have that work done, people need to have fun. We, in the IDF, should motivate people to work for IDF. Since money is scarce, the only thing we can use to motivate experts is the environment to do our work in an environment of friendship, fun and stimulating discussions. Yes, we can have different points of view, but we have to approach these differences scientifically and not politically. I hope I was able to bring some of these features into the group and in this way do my part in the on-going work of IDF. It was an honour to serve this committee. I wish my successor (at the moment I do not know any names yet) all the best in this interesting and challenging position.

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PhD Summaries

Udder health in dairy goats

Somatic cell count (SCC) in goats is generally much higher than in cows. It is, however, unclear to what extent high SCC reflects subclinical mastitis in goats. The primary goal of this thesis was to obtain a better understanding of SCC in dairy goats and its usefulness as a diagnostic tool to monitor mastitis. Other goals of this thesis were to evaluate the importance of minor pathogens in dairy goats, to study risk factors for intramammary infections and to estimate the costs of clinical and subclinical mastitis using simulation modelling.

Bulk milk SCC data were available for about 90% of all Dutch dairy goat herds. These data showed a clear pattern in SCC over the years (Figure 1). In the winter months, SCC was high and in the summer it was low. Questionnaires were used to study risk factors for high bulk milk SCC. One of the most important factors influencing SCC was days in milk (which is closely related to season, owing to the seasonal kidding pattern in goats): in late lactation, milk yield decreases and SCC increases. This gives a high bulk milk SCC in the months prior to the kidding season. Risk factors related

to udder health (such as liner material or treating mastitic animals instead of culling) were associated with bulk milk SCC, indicating that not only stage of lactation, but also mastitis influences SCC.

From five Dutch dairy goat herds, goats were selected for a longitudinal field study. Repeated milk yield, SCC and bacteriological culture data of these animals were collected to assess the effect of intramammary infection on SCC. The test characteristics of composite SCC for diagnosis of *Staphylococcus aureus*-infected goats were assessed using latent class models, which assume that neither bacteriological culture, nor SCC is a gold standard test. *S. aureus* had a low prevalence, but still it was the most prevalent major pathogen in our study. Minor pathogens (coagulase-negative staphylococci (CNS) and *Corynebacterium bovis*) were cultured much more frequently. For detecting *S. aureus*-infected goats, composite SCC was reasonably sensitive and specific, according to the latent class models, but bacteriological culture had a very low sensitivity. This may indicate that the true prevalence of *S. aureus*-

intramammary infection in goats is much higher than the apparent prevalence based on bacteriological culture.

The effect of intramammary infection on milk yield was studied in the same dataset. Infection with *S. aureus* was associated with lower milk yield, but not significantly so. Infection with CNS species as a group had no effect on milk yield, but surprisingly, infection with *S. caprae* was associated with higher milk yield. *Staphylococcus xylosus* was associated with lower milk yield, but this effect was not significant because of the limited number of observations. Also, infection with *C. bovis* was associated with significantly higher milk yield, comparable to the positive association between CNS-infection and milk yield that has been described in cows. It may be that high-producing goats are more at risk for infection with these minor pathogens, or perhaps infection with minor pathogens somehow has a beneficial effect, for instance by protection against infection with major pathogens.

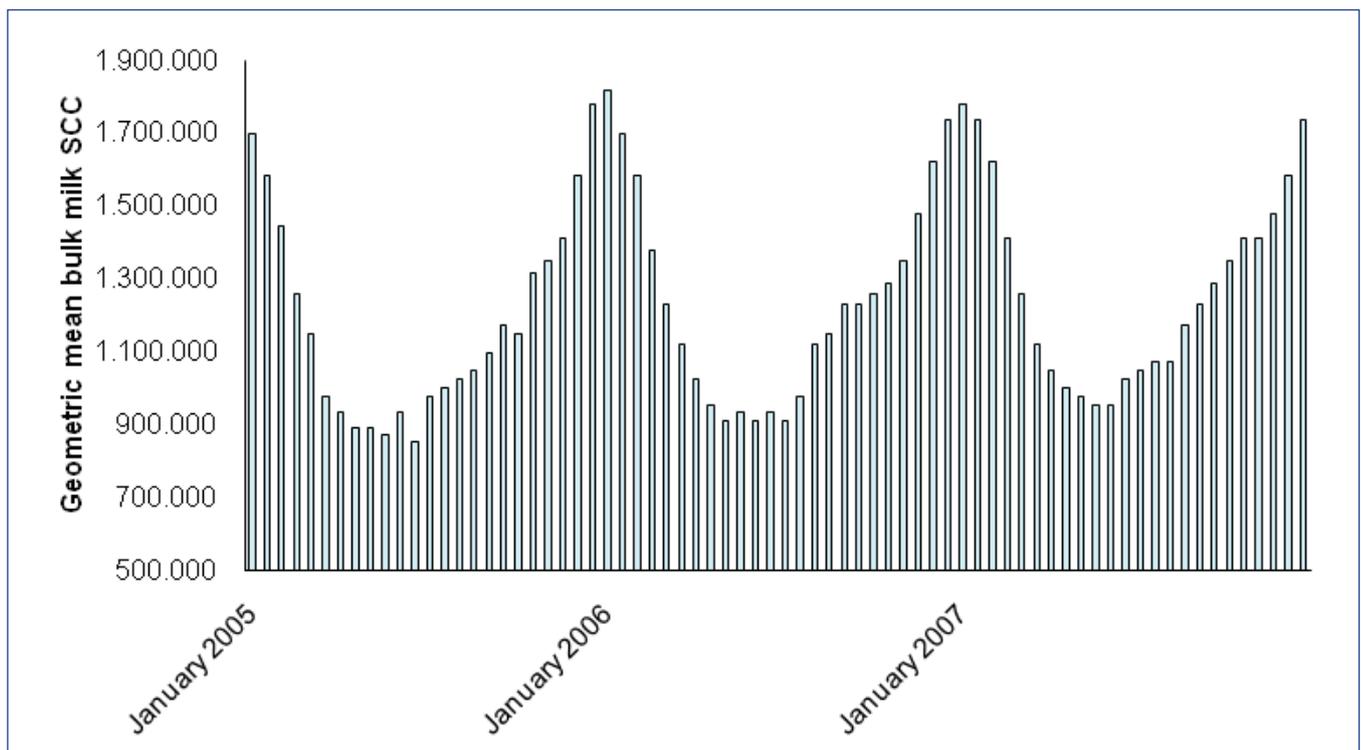


Figure 1. Bulk milk somatic cell count shows a constant pattern over the years in about 90% of all Dutch dairy goat herds.

Because of the limited milk yield losses associated with subclinical intramammary infection, the costs associated with subclinical mastitis in goats are small. However, clinical mastitis in goats is often very severe and in many cases results in culling of the goat or loss of the affected gland. Despite its low incidence in goats (about 2% per year), clinical mastitis causes significant economic losses which are mostly attributable to lost milk revenues after culling.

Clinical mastitis is often caused by *S. aureus* in goats. Therefore, it is important to know risk factors for intramammary infection with *S. aureus* in goats. Because we found

that sensitivity of bacteriological culture for *S. aureus* is low, we developed a latent class logistic regression model, which allowed us to study the effect of several risk factors on the probability of *S. aureus* infection, taking the imperfect test characteristics into account. A too deep udder (udder base below the hocks) as well as parity, late lactation and low milk yield were risk factors for *S. aureus* infection.

In conclusion, SCC can be used as a tool for detecting subclinically infected animals, and for monitoring udder health at herd level, but SCC is also strongly affected by stage of lactation. Staphylococci are the most important bacteria, with *S. aureus*

being responsible for most clinical cases and associated economical losses, whereas CNS species are the most common cause of subclinical mastitis, but appear to cause little damage.

A digital copy of the thesis can be obtained from:

<http://igitur-archive.library.uu.nl/dissertations/2012-0112-200713/UUindex.html>

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Contaminated dust may cause Johne's disease

The organism causing Johne's disease in cattle, *Mycobacterium avium* subspecies *paratuberculosis* (MAP) has been detected in dust samples collected on commercial dairy farms in the Netherlands. It was shown that the bacterium is transported throughout the barn together with dust and is found in places that are not accessed normally by cows. Additionally, an experimental study in calves showed that MAP infection can be established after aerosol challenge via nose or lung.

Johne's disease is a bacterial infection of the small intestine of cattle that, once clinical, causes severe diarrhoea. Since there is no cure for this disease prevention of transmission is the main focus of Johne's control programs to reduce economic losses for farmers and health welfare issues for cows.

Disease transmission

Young calves up to 6 months are most susceptible for MAP. MAP is shed by adult cows in faeces, colostrum and milk so direct contact of calves with adult cows should be prevented. A small proportion of calves become infected already before they are born, especially in cases when the dam already has clinical symptoms of disease. Calves once infected stay in a subclinical state of disease for several years and are difficult to identify as infected with available tests. After 3-5 years the disease progresses and infected animals become more infectious to their offspring and their environment. MAP is known to survive for some time in the environment implying that a contaminated environment can still be infectious for a certain time for young stock even after removal of infected cows.

Prevention of transmission

To prevent disease transmission control programs focus on separating young stock and dairy cows as soon as possible after birth. In addition, hygiene measures around calving are improved. Identifying and removing infectious cows from the herd is also an important part in reducing MAP transmission. Although control programs in some countries have been implemented for some time now and disease prevalence reduced, it has not been possible to achieve eradication of Johne's disease.

Dust and bioaerosols as a route of transmission

In animal housings dust consisting of skin, hair, food and faecal particles and therefore containing a lot of different bacteria is present abundantly. For other bacterial infections transmission via dust and bioaerosols is known to occur but for Johne's this route was only hypothetical until now.

On an experimental cattle farm high and medium MAP shedders were housed for a period of one and a half years and environmental settled dust samples were collected inside and outside the barn. Dust samples were cultured and viable MAP was found. Dust sampling was repeated on commercial dairy farms with a low MAP prevalence determined by milk ELISA results. Dust samples were collected in the dairy barn but also in young stock housings. Samples of two certified Johne's free herds were MAP negative, proving the specificity of the method. In all other dairy farms at least one dust sample collected in the dairy barn was MAP culture positive. Dust

samples were free of MAP when young stock was housed in separate buildings from adults. In contrast viable MAP was detected when young stock and adult cows were housed separately but within the same building. These findings suggest that exposure of calves to viable MAP on Johne's-positive dairy farms can only be prevented by housing calves in separate barns from adults.

Relation between the number of MAP positive cows and the environmental contamination with MAP

In a longitudinal study on 8 commercial dairy farms milk and dust samples were collected every 4 weeks for a period of two years. Dust samples were cultured for the presence of viable MAP and milk samples were analyzed for specific antibodies by ELISA. Preliminary data analysis revealed that the number of MAP positive dust samples increases with the number of milk ELISA positive cows in the herd. This study confirmed that in separate young stock housings no viable MAP was detected in dust, underlining the importance of separate housing systems for young stock and adult cows.

Barn sanitation

Hygiene measures are important to reduce environmental contamination. The efficiency of 2 cleaning methods was investigated on 2 farms which were completely depopulated because of high Johne's prevalence. After cleaning by means of a high pressure cleaner viable MAP was still detected in some dust samples in both

barns. In one farm cleaning was combined with disinfection with Halacid® while the other barn was kept empty for a period of 2 weeks following the high pressure cleaning. Since no viable MAP was detected in dust samples of either barn both procedures appear to have resulted in efficient reduction in MAP contamination. Notwithstanding this, high pressure cleaning should only be performed in a completely empty barn since high pressure cleaning will lead to formation of MAP contaminated bioaerosols.

Intestinal MAP infection after MAP uptake via the respiratory tract

Although dust after settling can easily be ingested by calves exploring their environment by licking and suckling, the isolation of MAP from dust samples raised the question whether an intestinal infection can occur after respiratory uptake. In a pilot study 12 calves were inoculated with MAP through the respiratory tract. In six calves MAP was administered as an aerosol through the nostril while in six other calves

MAP was inoculated directly into the trachea. At necropsy, three months after inoculation, MAP was isolated from tissue samples of the small intestine of all calves indicating that the respiratory tract can act as a portal of entry. To prevent transmission to occur through this route calves and adult dairy cattle should be housed in separate buildings as soon as possible directly after calving.

This is a summary of the PhD thesis entitled 'Within-farm dispersion of *Mycobacterium avium* subspecies *paratuberculosis* by bioaerosols', 2011. More detailed information is available in the following papers:

1. Eisenberg, S.W.F., A.P. Koets, M. Nielen. Within-farm transmission of bovine paratuberculosis: recent developments, 2012. *Vet Quart*, 32: 32-35.
2. Eisenberg, S.W.F., A.P. Koets, M. Nielen, D. Heederik, R. Mortier, J. De Buck, K. Orsel. Intestinal infection following aerosol challenge of calves with *Mycobacterium avium* subspecies *paratuberculosis*, 2011. *Vet Res*, 42: 117-124.
3. Eisenberg, S.W.F., M. Nielen, J. Hoeboer, M. Bouman, D. Heederik, A. Koets. Case Report: *Mycobacterium avium* subsp. *paratuberculosis* in bio-aerosols after depopulating and cleaning two cattle barns, 2011. *Vet Rec*, 168: 587-590.
4. Eisenberg, S.W.F., A.P. Koets, J. Hoeboer, M. Bouman, D. Heederik, M. Nielen. Presence of *Mycobacterium avium* subsp. *paratuberculosis* in Environmental Samples Collected on Commercial Dutch Dairy Farms, 2010. *Appl Environ Microbiol*, 76: 6310-6312.
5. Eisenberg, S.W.F., M. Nielen, W. Santema, D.J. Houwers, D. Heederik, A.P. Koets. Detection of spatial and temporal spread of *Mycobacterium avium* subsp. *paratuberculosis* in the environment of a cattle farm through bio-aerosols, 2010. *Vet Microbiol*, 143: 284-292.

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Epidemiological Studies of Reproductive Performance Indicators in Swedish Dairy Cows

The overall aim of this thesis was to gain knowledge about factors which affect reproductive performance indicators used by herd advisory services. The thesis comprised four different scientific papers. The specific aims of the thesis were: I) to study factors affecting the reproductive performance indicators that currently are used in advice at the herd level in Swedish dairy herds, II) to investigate if data management was affecting the reproductive performance indicators and also to study if there were any systematic effects on the accuracy of the indicators, III) to evaluate alternative definitions of reproductive performance indicators adjusting for the voluntary waiting period and IV) to study factors affecting a reproductive performance indicator that was adjusted for the voluntary waiting period at the cow level.

In paper I associations between reproductive performance indicators and herd level factors were studied. Data were retrieved from the Swedish official milk records and 2728 herds, with an average herd size of 45 or more cows, were included in the study. The associations were investigated using linear and logistic regression models. Our study showed many statistically significant

associations between herd characteristics and reproductive performance. When allocating advisory service resources to improve reproductive performance focus should be on herd characteristics that are easy to influence, such as total mixed rations and do-it-yourself inseminations.

In paper II we studied how data management affected reproductive performance indicators at herd level and the influence of herd characteristics on this effect. Data from 483 herds in the Swedish official milk recording scheme were used. Agreement was assessed as the change in performance indicators from a routine calculation to an extra calculation, where updated data were included. Changes of more than $\pm 5\%$ were considered indicative of disagreement. The amount of disagreement for the reproductive performance indicators was variable. Percentage of non-returns at 56 days showed no disagreement, while number of inseminations per animal submitted to AI showed the largest disagreement. Some herd characteristics, e.g. do-it-yourself inseminations, percent pregnancy checked and rate of inseminations, affected the amount of disagreement.

In paper III we evaluated two reproductive

performance indicators that consider the voluntary waiting period (VWP) at the herd; percentage of pregnant cows in the herd after the VWP plus 30 days (PV30) and percentage of inseminated cows in the herd after the VWP plus 30 days (IV30). We assessed how PV30 and IV30 performed in a simulation of herds ($n=900$) with different levels of reproductive management and reproductive physiology and we compared them to indicators of reproductive performance that do not consider the herd voluntary waiting period. Logistic regression models, together with receiver operating characteristics (ROC), were used to examine how well the reproductive performance indicators could discriminate between herds of different levels of reproductive management efficiency or reproductive physiology. We concluded that the PV30 was the single best performance indicator for estimating the level of both herd management efficiency and reproductive physiology followed by Not-InCalf at 200 days and InCalf at 100 days. This indicates that PV30 could be a potential candidate for inclusion in dairy herd improvement schemes.

In paper IV we studied whether factors that are known to affect reproductive efficiency

also affected the indicator PV30 (that we studied in paper III), but at the cow level, i.e. pregnant or not at the herd VWP plus 30 days. This was done using generalized estimation equations that adjusted for the clustering of the data at the herd level. All cows that calved between 1 July 2008 and 30 June 2009 and originated from herds that had more than 50 milking cows on average were available for inclusion in the study. After data editing 132 721 cows in 1421 herds remained. Our results show that well-known associations apply also

after adjusting for herd management factors such as VWP.

Trying to extend our results to a broader perspective, one could argue that current negative trends in reproductive efficiency cannot be explained solely by the ongoing structural change in herd management. This is because of the findings of better reproductive performance in some of the systems that will be predominant in the future. It is conceivable that the negative trends in overall reproductive efficiency

experienced in most industrialized countries in recent decades are indeed due to changes in animal factors and not only to changes in management and herd structure.

Link to the thesis:
<http://pub.epsilon.slu.se/8802/>

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Pheromones for modulating reproduction in cattle. Biological potential of oestrus-related substances in intra- and interspecies chemical communication



Figure 1. Heifers were exposed to experimental substances using a modified nose rings. Here seen during blood sampling. Photograph by Carola Jansson, SLU.

Declining dairy cow fertility, largely attributable to increasing milk yields, is of major concern to dairy farmers worldwide. New tools for reproductive management,

to replace exogenous hormones, would be of great interest. Chemical communication in cattle has been suggested to cause modifications of the oestrous cycle. Here,

reproductive parameters were monitored in ten dairy heifers during five oestrous cycles. They were exposed to distilled water (control) or oestrous urine and



Figure 2. Ovarian activity of all experimental animals was monitored during frequent ultrasonographic examinations. Photograph by Renée Båge, SLU.

vaginal mucus (treatment). Four of them were also subjected to intensive blood sampling to study the treatment effect on the luteinizing hormone (LH) pulsatility pattern preceding the preovulatory LH surge. We found that the treatment had significant effects on when the different signs of oestrus occurred and on the intensity of oestrus expression. There was a tendency for treatment to have an effect on the preovulatory LH surge characteristics whereas LH pulsatility pattern was significantly affected by the treatment. To find a quick bioassay to detect bioactive bovine body fluids, two heifers and two bulls were exposed to different body fluids while their heart rates were registered. Although the exposure caused significant effects, they were not of sufficient magnitude to be useful. Further attempts to find a bioassay to identify oestrus-specific compounds included using the face fly as a biological detector. Female flies were allowed to choose between either oestrous or luteal urine and distilled water (control) in a Y-tube olfactometer. Flies were significantly repelled by oestrous urine, but not by luteal urine. Gas chromatography coupled with electroantennographic detection (GC-EAD)

revealed no behaviourally active, oestrus-specific compounds. Comparison of chromatograms, however, showed that one

compound, later identified as cetyl alcohol (1-hexadecanol), was more abundant in oestrous urine than in luteal urine. When tested at different doses, the lowest dose of cetyl alcohol was found to attract flies, while the second lowest dose was repellent and this corresponds with our findings from the urine behavioural assay.



Figure 3. Heifers were exposed to experimental substances using a modified nose ring. Photograph by Carola Jansson, SLU.

We found effects of exposure to body fluids on cyclicity in heifers, as well as on heart rate in cattle, which supports the existence of bovine pheromones. We also found that the face fly could discriminate between oestrous urine and luteal urine, probably based on the amount of cetyl alcohol in the samples. Neither monitoring of heart rate, nor using the face fly as a biological detector, were suitable bioassays for detection of bovine pheromones.

Link to the thesis: http://pub.epsilon.slu.se/8894/2/nordeus_k_120517.pdf

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Genetic variation and spread of some important udder pathogens in dairy cows in Sweden

In a current PhD project at the National Veterinary Institute and Swedish University of Agricultural Sciences, the overall aim is to gather knowledge about udder infections in dairy cows caused by *Staphylococcus aureus*, *Streptococcus dysgalactiae* and *Streptococcus uberis*, and about how such infections are prevented.

In Sweden, *Staphylococcus aureus*, *Streptococcus dysgalactiae* and *Streptococcus uberis* are important udder pathogens causing a large proportion of clinical and subclinical mastitis cases in all parities. Most cases of clinical mastitis occur soon after calving, with first parity cows being especially affected at this time. The earlier in lactation the cow gets mastitis the greater the consequences will be on milk production and udder health. Therefore, it is of major importance to learn more about how better to prevent these infections. *S aureus* is considered predominantly contagious, whereas *Str uberis* is considered to be predominantly environmental. *Str dysgalactiae* is harder to classify, but all three pathogens have been reported to be able to spread both from cow to cow and from environmental sources to cows. *S aureus* and *Str dysgalactiae* are particularly common findings in cases occurring the first days of lactation in Swedish first parity cows. This indicates that infections take place before first milking, which means

that the sources of at least these infections are environmental. In strain typing studies, genotypic variation among bacterial isolates of *Str uberis* usually show a heterogeneous pattern consistent with environmental pathogens, but in some herds homogenous patterns are found suggesting that one strain is spread between cows. Strain typing studies have also been used to show that the severity of inflammation and treatment success of mastitis cases partly can be explained by which genotype of *S aureus* is causing the infection.

The aim of the first part of the PhD project is to study the genetic variation among *S aureus*, *Str dysgalactiae* and *Str uberis* and to investigate if genotypes within bacterial species differ regarding cow factors (such as breed, lactation number, lactation stage), the outcome of disease, and the presence of virulence genes. Isolates of *S aureus*, *Str dysgalactiae* and *Str uberis* from cases of clinical mastitis have been collected in a national survey. For the analysis only one isolate per herd, and isolates from previously healthy cows having signs of mastitis in one udder quarter have been included. *S aureus* isolates have been genotyped by pulsed-field gel electrophoresis (PFGE) and divided into pulsotypes accordingly. Preliminary results can be seen in Figure 1. Four pulsotypes together accounted for about 75% of the isolates analyzed, and one of

these pulsotypes was more widespread than the others. Genotyping of the streptococci is under way. Genotype data will be correlated to cow factors and outcome data such as somatic cell count, new veterinary treatments and culling to investigate if pulsotype influences the outcome variables.

In the second part of the project the aim is to investigate when udder infections caused by the above mentioned pathogens occur in relation to calving and if patterns of infection are similar in different periods of the year and between younger and older cows. For this part milk samples have been collected from every second heifer and cow in the course of one year in about 15 herds. Selected herds were free-stall herds, above average in size (70-250 cows), using conventional milking parlours and having poor udder health as defined by proportion of cows with high somatic cell count. Quarter samples were taken at first milking after calving, again four days later and from cases of clinical mastitis during the first month of lactation. All samples were sent to the National Veterinary Institute where they were cultured on blood agar plates and pathogens of interest were identified according to local laboratory protocol. Differences in occurrence of bacterial agents between samplings, between seasons, and between younger and older cows are being investigated. A selection of isolates will be pulsed.

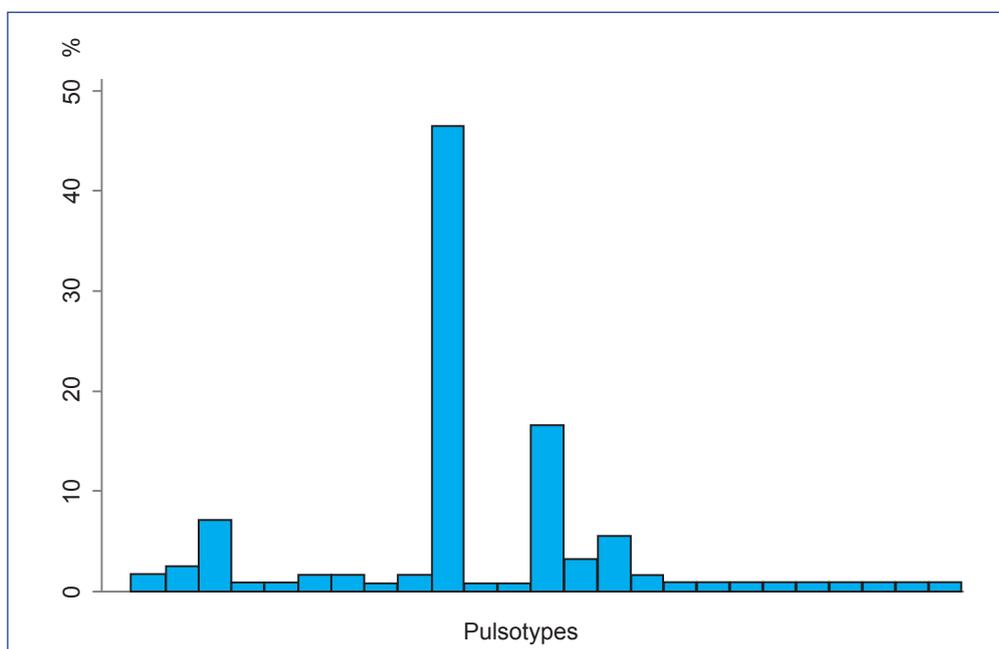


Figure 1. Staph aureus isolates (n=127).

Any connections found in the second part will be used to direct us in the third part of project where the aim is to identify important sources of these three pathogens. To achieve this, samples will be taken from various body sites and the close environment of animal groups of interest.

The project is financed by Formas and Swedish Farmers' Foundation for Agricultural Research and is estimated to close in 2015.

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Validation of the Nordic disease recording systems for dairy cattle *With special reference to clinical mastitis*

The Nordic countries Denmark (DK), Finland (FI), Norway (NO) and Sweden (SE) have established disease recording systems for dairy cattle. Focus is on diagnoses related to production diseases. Disease records are submitted to a national database, and for herds enrolled in the official milk recording schemes the information can be combined with, e.g., milk production, fertility and slaughter data at the individual cow level. Disease data are used for herd management, advisory work, breeding programmes and statistics.

The disease recording systems are mainly based on veterinary recordings. In comparison to most other countries, the Nordic countries' legislations regarding prescription drugs, such as all types of antibiotics, are strict. In general, a clinically diseased cow has to be examined by a veterinarian before treatment is initiated. However, in DK farmers with a certain type of herd health agreement with their veterinarian may initiate treatment themselves. In FI milder cases of clinical mastitis (CM) may be treated with antibiotics for intra-mammary use. The veterinarian may prescribe such compounds without a visit based on bacteriological results indicating udder infection. Nevertheless, all CM cases that are diagnosed with CM and treated with prescription drugs should be recorded and the information should be submitted to the national database.

Previous work has suggested that the Nordic disease recording systems may differ in their ability to successfully identify diseased cows. Therefore, the overall aim of the thesis was to validate the Nordic disease recording systems for dairy cattle, with a focus on CM. The two first studies were performed within a Nordic project called DAHREVA, which also covers metabolic, locomotor

and reproductive disorders. The third and fourth studies were performed within Sweden only.

In the first (baseline) study, Nordic dairy farmers ($n=580$) recorded clinical disease during four months. Their registrations were compared to records in the national cattle databases. The completeness, i.e. proportion of CM cases recorded as veterinary-visited (or veterinary-supervised) by farmers and found in the national databases was 0.94 (DK), 0.56 (FI), 0.82 (NO) and 0.78 (SE). The incidence rates (IR) of CM in farmer recordings and from the national databases were calculated. In FI the IR in the central database (for the sampled herds) was significantly lower than the IR of veterinary-supervised CM (as recorded by study farmers).

The second study investigated the farmer behaviour that initiates reporting, i.e. to contact a veterinarian. A questionnaire, based on the social psychology Theory of Planned Behaviour, was distributed to dairy farmers. Focus was on cases of mild CM. Analysis of the responses ($n=834$) showed differences between the countries in farmers' behavioural intention. The results suggested that farmers in DK and NO have a lower threshold for contacting a veterinarian compared to farmers in SE. In all four countries the attitude, which concerns the expected outcome of a specific behaviour, was the most important determinant of behavioural intention.

The third study involved 112 Swedish dairy herds and assessed the information loss from known veterinary-visited disease events to the national database including all types of diagnoses in dairy cattle. This was done by comparing veterinary receipts left on farm against information in the database at the Swedish

Board of Agriculture (SBA) to which Swedish veterinarians should submit their disease records. The disease information is further transferred to the national cattle database at the Swedish Dairy Association (SDA) and the veterinary receipts were compared to disease data in the SDA database as well. The overall completeness for diagnostic events was 0.84 (SBA) and 0.75 (SDA), but varied between disease complexes, regions and veterinary employment type. Loss during transfer was mainly due to insufficient mapping between the coding systems used.

The spatial distribution of veterinary-registered CM in Sweden was described in the fourth study, and areas with significantly higher or lower probability of registered CM were identified. When compared against the distribution of herds with poor udder health (indicated by high somatic cell counts) areas with suggested under-reporting of CM could be identified.

In conclusion, the results indicate that the disease recording systems in DK, FI, NO and SE do not capture all veterinary-supervised events of CM due to losses during the recording process, and these losses are not randomly distributed over the country. Moreover, there were country specific differences in the farmer threshold for the action that initiates the recording process.

Link to the thesis:
<http://pub.epsilon.slu.se/8546/>

Acknowledgements to my supervisors:
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Other Research

Evaluation of propane flaming of sand for reducing bacterial counts in bedding



The use of propane flaming of recycled sand was investigated as a means to control mastitis pathogen populations in bedding. On-farm recycling of bedding by separation of sand from manure reduces bedding costs and aids the environmental sustainability of farms by decreasing over-the-road cartage costs and soil compaction of farmland. However, the subsequent use of sand reclaimed from passive water-settling ponds or mechanical separation often results in increased exposure of cows to mastitis pathogens. As organic content and moisture in sand bedding increases with on-farm reclaiming sand from manure, the mastitis pathogen populations also increase. The use of propane flaming has the potential to serve as a clean and rapid antibacterial procedure without contaminating the environment with harsh chemical disinfectants often used in organic bedding materials.

The experiment was conducted on a commercial farm with approximately 600 lactating cows housed in free-stall barns. Each stall was bedded with a minimum of 150 mm of sand. Fresh sand was added to all stalls to a minimum depth of 150 mm weekly. One row of free stall was flamed within 12 hours after fresh bedding was added to stalls and then daily for the next 6 days. One row of free stalls was the untreated control. Stalls received the same treatment for 3 consecutive weeks.

After 3 weeks on a bedding treatment, bedding treatments were changed between rows. The trial was 6 weeks so that stalls were exposed to both bedding treatments in a switch-back design to account for differences among stalls. Bedding samples were collected from both treatment rows immediately after sand was flamed (day 0) and immediately before flaming 1, 2, and 6 days later. Bacteriological counts, organic matter, and dry matter were determined for each sample. The flaming unit was a prototype purchased and mounted on 50 horsepower (373 kW) tractor. A tractor mounted rake with tines approximately 75 mm in length tilled bedding 150 mm preceding the flame.

The daily movement of the 760° C propane-fueled flames at 3.2 kilometres per hour over the surface of recycled sand bedding in stalls did provide a positive effect by reducing mastitis pathogen loads in recycled sand at different depths of bedding in a pathogen specific manner. The greatest reduction of mastitis pathogen populations by flaming was on the surface 25 mm of recycled sand. Reductions in bacterial counts at greater depths were less consistent. Bacterial populations in both flamed and control sand bedding were lower on the surface 25 mm compared with sand at the 50 to 75 mm depth. The effects of subsequent flaming of sand over a week also differed among pathogens. In

general, mastitis pathogens were reduced to the greatest extent the day recycled sand was added to stalls and flaming was less effective as sand bedding was in stalls over a 6 d period.

The physical properties of sand were altered less than the bacteriological populations. Dry matter and ash percentages did not differ between treatment groups within the proximal 25 and 25 to 50 mm layers of sand. Flaming did increase dry matter percentage and ash content of bedding in the 50 to 75 mm depth immediately after flaming, but had no effect on subsequent samples. The dry matter content of sand was lowest in the 50 to 75 mm depth in freshly bedded sand and increased in each layer of bedding during the week in both treated and control sand.

The use of propane flaming of recycled sand was shown to have potential as a practice to control mastitis pathogen populations in bedding. The greatest advantage afforded by flaming was on the surface of bedding with inconsistent effects deeper in the stalls. Flaming was more effective in controlling bacterial populations of freshly recycled sand than in sand after several days use.

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Disease incidence and somatic cell count in Norwegian herds with different size

The Dairy Industry in Norway, like those in many other countries, has gone through a structural change in recent decades. This structural change is partly driven by cost effectiveness when building new stalls for dairy cattle, and partly driven by animal welfare standards, imposed by regulations, saying that all dairy cattle should have the freedom to move around in their barn (free-stalls) by the year 2024. Ten years ago Norway had typical small-farm milk production, with a mean herd size of 12 cows per farm. In 2011, herd size has reached 22 cows. At present the proportion of proportion of farms with free-stalls has increased to 35 %; and 50 % of the cows are at present in free-stalls. These new free-stall barns typically have between 50 and 100 cows each, and are very suitable for automatic milking systems (AMS). As Norway is a high cost country, AMS will save money both in building costs and in labour costs. This is probably the reason why Norway at present has one or two AMS installed in 40 % of the free-stall barns, and 50 % of the cows in free-stalls are milked with AMS. Altogether this means that, at present, approximately 25 % of the cows in Norway are milked with an AMS. As about 97 % of the herds are members of the animal recording system and this system also includes all recording of medical treatments of all kind of diseases, we

have the opportunity to compare disease incidence as well as somatic cell count data from smaller and larger herds with AMS (Table 1).

Table 1 illustrates a large difference in the rate of disease treatments between larger herds (> 50 cows) and smaller herds (between 12 and 17 cows). The larger herds have a higher milk production, a higher BMSCC, much lower treatment rate of mastitis and ketosis, but a higher treatment rate of calf diseases. Comparing AMS herds with non-AMS herds there is not much difference, except for higher milk production, lower treatment rate for clinical mastitis and higher disease incidence for calf diseases in AMS herds and non-AMS herds of the same size. This illustrates that there is a need to take into account herd size when comparing disease incidence. Smaller herds tend to have a higher treatment rate. This could simply be due to more attention being given to individual cows, or/and that each cow in smaller herds will have a higher relative money value. One of the most interesting findings in this analysis is that there is not much difference between smaller and larger herds, or AMS herds comparing the most objective mastitis parameter, new CMSCC > 200 000. This is a variable that cannot be manipulated by management decisions by

the farmers, as could well be the case for BMSCC (sorting of milk) or treatment rate (different threshold values for medication). This means that, objectively, smaller and larger herds have the same udder health status, although they tend to handle udder health totally differently. Farmers with smaller herds seem to be more eager to follow up individual cows for treatment and thus get lower BMSCC than farmers with larger herds. The economic results of this mastitis management show that larger herds have fewer economic losses than smaller herds, probably because farmers with smaller herds tend to overinvest in medical treatment.

Ketosis seems to be a small herd problem, indicating that feeding management is better in larger herds. There is a higher treatment rate for calf diseases in larger herds probably due to higher infectious pressure as the animals in larger herds have access to susceptible new-born calves the whole year round, while smaller herds would have periods in the year with no new-born calves at all.

It is peculiar that AMS herds have significantly more calf diseases than other herds of the same size. This could be due to different attitudes on these two types of farms.

The difference in milk yield and disease incidence in smaller and larger herds, both in tie-stalls and free-stalls has been published earlier (Simensen et al., 2010), with results that fit well with the results of this study. It is also interesting to see that AMS seems to work very well concerning udder health, and is at present very popular and increasing.

Reference:

Simensen, E., O. Østerås, K. E. Bøe, C. Kielland, L. E. Ruud, G. Næss. 2010. Comparison of milk yield, reproduction performance and disease incidence between Norwegian free-stall and tie-stall dairy herds. *Acta Vet. Scand.* 2010, 52:14. Accessed 25.2.2010: <http://www.actavetscand.com/content/52/1/14>

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Table 1: Comparison of disease incidence and somatic cell count (SCC) data from herds of different sizes, with and without AMS.

Health parameter	Small herds	Larger herds	Herds with AMS
Number of herds	2265	185	319
Cows in each herd	12- 17	> 50	>50
Milk yield per cow-year	6832	7414	7851
BMSCC (geometric mean)	123 000	154 000	157 000
Composite milk SCC samples > 200 000 (%)	20.5	21.9	20.9
New CMSCC > 200k when previously < 200k (% of cows)	55.0	53.1	53.7
Estimated duration of CMSCC > 200 000 in months	4.48	4.96	4.66
Cases severe/moderate clinical mastitis (per 100 cow-years)	23.3	16.6	13.6
Incidence all clinical cases (per 100 cow-years)	24.5	16.9	13.8
Estimated total mastitis loss in NOK per liter milk	0.128	0.117	0.107
Reproduction index (high is good)	58.1	67.9	69.9
Ketosis treatments (per 100 cow-years)	3.8	0.9	0.7
Milk fever treatments (per 100 calvings after 1st)	4.0	3.6	4.0
Reproduction treatments (per 100 cow-years)	7.7	6.3	6.3
Treatments for calf diseases (per 100 calves, 180 days)	3.2	6.4	9.0
Total disease treatments (per 100 cow-years)	90.8	74.5	78.4

Endotoxin tolerance in lactating dairy cows

Early lactation cows tend to succumb to rumen acidosis because of the drastic diet change they encounter once they give birth. Cows tend to be fed rations before parturition that are low in energy and high in structural fiber. Following parturition, the cow must consume high energy feed to supply nutrients for maximal milk production. This scenario of altering feeds early in lactation predisposes the cows to rumen acidosis. The highest incidence of coliform mastitis in dairy cows is during early lactation which corresponds with the time of increased risk for rumen acidosis developing. A possible connection between the two disease processes is the shift in rumen microbes during acidosis. Subacute rumen acidosis causes a sustained, subclinical release of the toxic compound endotoxin into the bloodstream. The prolonged exposure to subclinical amounts of endotoxin can lead to eventual immunological suppression or tolerance to endotoxin. Endotoxin is the primary virulence factor causing clinical illness during coliform mastitis. Determining the possible relationships between these two disease processes may lead to resolution of both for dairy producers.

The development of endotoxin tolerance was tested by inducing experimental endotoxin mastitis in cows that experienced rumen

acidosis. Rumen acidosis was induced by feeding diets that were either high energy feeds for prolonged period or by sudden shifts from low to high energy diets. Milk fatty acid profiles were used to diagnose rumen acidosis. Cows that had experienced rumen acidosis prior to experimental endotoxin mastitis displayed signs of endotoxin tolerance in the mammary gland. Local host defense factors against endotoxin, such as milk amyloid A and somatic cell counts, were suppressed in speed and magnitude of response in cows with rumen acidosis compared with control cows without acidosis. This tolerance of endotoxin in cows with rumen acidosis was confined to the mammary gland responses and not evident in systemic clinical mastitis signs.

The discovery of a biological relationship between the occurrence of rumen acidosis and reduced immunological response to coliform mastitis is critical to the resolution of two economically devastating diseases of dairy cows. The prolonged exposure of cows with acidosis to the release of endotoxin caused by the death of rumen microbes results in the cow becoming tolerant or non-responsive to endotoxin. Simultaneous or subsequent development of coliform mastitis renders the cow less able to combat the endotoxin because

of tolerance generated by the prolonged endotoxin release by rumen microbes. This insight has laid the foundation for development of successful therapeutic and management strategies to prevent two of the most important diseases in dairy cows. These findings will assist dairy producers and veterinarians limit economic losses, optimize milk production efficiency and improve animal welfare.

In summary, the metabolic and infectious diseases that cause the greatest economic losses to the dairy industry are rumen acidosis and mastitis, respectively. A biological relationship was found between the occurrences of rumen acidosis and reduced immunological response to coliform mastitis. Cows suffering rumen acidosis become tolerant to the toxins released into the mammary gland by coliform bacteria. These findings will result in new management and therapy strategies for increasing milk production without causing adverse effects on productivity, health and welfare of dairy cows.

MS Thesis

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Ongoing Work in IDF and OIE

Project on reference system for somatic cell counting

Food analyses require a high level of quality assurance to meet the requirements of global market trade and food legislation. Worldwide reliability and comparability of analytical data depend on quality assurance tools such as standardized procedures, certified reference materials and proficiency testing. Somatic cell counting is an important parameter in the dairy sector. In many countries it is a criterion required by legislation for the hygienic quality of milk and is relevant for milk payment, on-farm management and breeding programmes. In 2009 a joint IDF/ICAR Project on Reference System for Somatic Cell Counting was initiated with the ambition to promote better analytical equivalence in somatic cell counting in milk worldwide. A project group of 28 members from 19 countries and 4 continents has since then made good progress with the development of the building blocks for this reference system.

Certified reference materials (CRM) are not available for somatic cell counting in milk. To get a picture on the reference materials for somatic cell counting that are actually used in dairy laboratories, two international questionnaires were issued in 2010. From the more than 200(!) replies it was clear that applied reference materials are different in matrices, in range and in type of cells. Based on available research data and collected experiences, the project group has prepared a document listing the minimum requirements for reference materials for somatic cell counting. In addition, a protocol for the preparation of

certified reference material ('gold standard') was developed. Together with the EU Joint Research Centre and the Institute for Reference Materials and Measurements in Geel (BE) an investigation is underway on the feasibility of the production of the CRM concerned.

For the **characterization of the reference material** it is intended to use both results from reference method analysis as well as from routine method analysis. The quality of these data must be ascertained. For an objective judgement, it is intended to assess the quality of the contributing laboratories by taking their performance in proficiency testing into account. Of course, then also the quality of the proficiency testing schemes concerned must be assessed. A model for this has been tested with data from various sources. It appears that the model is already working well for the assessment of laboratories but needs to be optimized to assess the proficiency testing schemes. The chosen probabilistic approach will be tested in a pilot study to evaluate its robustness and functioning before proposing its adoption on a wider scale.

From the replies to the questionnaires it was also possible to draw a map of **existing interlinkages between laboratories**. Interlinkages that result from the use of the same reference material and/or through participation in the same proficiency testing scheme. The project on the development of reference system for somatic cell counting

in milk aims to capitalize on these existing interlinkages, the so called bottom up approach! The dairy laboratories that deal with the determination of somatic cells can in fact already use these existing interlinkages to anchor their analytical results. This can to a certain degree already create internationally oriented traceability and comparability for their results.

The project group works with a **communication plan** in order to ensure a proper promotion of the project, to retrieve and share information and to retain the attention of the different stakeholders. Official recognition by regulatory bodies and competent authorities of the final outcome is sought. The Project Group has delivered several presentations of the project in international conferences and some publications in international journals. Moreover, before the end of 2012 four Newsletters will have been issued. These communications are oriented to the analytical stakeholders (dairy laboratories, reference materials and proficiency test providers) as well as to authorities and other relevant stakeholders. The implementation of the system is now expected from 2014.

For further information, see: <http://www.fil-idf.org/Public/TextFlowPage.php?ID=37599>

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Project Group Reference System SCC members

How the World Organisation for Animal Health (OIE) promotes responsible and prudent use of antimicrobial agents for animals



Antimicrobial agents are essential tools for protecting animal health and welfare. They also contribute to satisfying the increasing global demand for safe food of animal origin, such as milk and meat. To ensure sustainability of livestock production, the efficacy of antimicrobial agents must be preserved through their responsible and prudent use.

Antimicrobial resistance is a global human and animal health concern that is influenced by both human and non-human usages of antimicrobial agents. The human, animal and plant sectors therefore have a shared responsibility to minimise antimicrobial resistance selection pressures on human and non-human pathogens and to contain antimicrobial resistance, illustrating the One Health approach.

The World Organisation for Animal Health (OIE) is an intergovernmental organisation with a mandate from its 178 Member Countries to improve animal health, veterinary public health and animal welfare worldwide. The standards, guidelines and recommendations developed by the OIE are recognised as the reference documents for animal health and zoonoses by the World Trade Organization (WTO) in the framework of its Agreement on the Application of the Sanitary and Phytosanitary Measures.

The OIE has worked actively for more than a decade on veterinary products, including antimicrobial agents, and developed a strategy for its activities in this area that is based on:

- Promotion of responsible and prudent use of antimicrobial agents in veterinary medicine;
- Reinforcement of good governance of Veterinary Services;
- Better knowledge and monitoring of the quantities of antimicrobials used in animal husbandry;
- Harmonisation of national antimicrobial resistance surveillance and monitoring programmes;

- Implementation of risk assessment measures.

The OIE has developed standards and guidelines, published in the OIE *Terrestrial Animal Health Code* and the OIE *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals*, on:

- Harmonisation of national antimicrobial resistance surveillance and monitoring programmes (Chapter 6.7)
- Monitoring of the quantities and usage patterns of antimicrobials agents used in food producing animals (Chapter 6.8)
- Responsible and prudent use of antimicrobial agents in veterinary medicine (Chapter 6.9.)
- Risk assessment for antimicrobial resistance arising from the use of antimicrobials in animals (Chapter 6.10)
- Laboratory methodologies for bacterial antimicrobial susceptibility testing (Guideline 3.1)

Several chapters have been reviewed by an ad hoc Group (Chapters 6.7, 6.8, and Guideline 3.1) and updated versions were adopted at the 80th General Session in May 2012.

To incorporate recent developments, Chapters 6.9. and 6.10. are currently under revision, as is the OIE list of antimicrobials of veterinary importance, which will become a practical tool to provide guidance to Member Countries.

Given that antimicrobial resistance is a global, multidisciplinary issue, the OIE works closely with all its Member Countries, as well as with international organisations such as WHO, FAO and the Codex Alimentarius Commission to obtain the benefits of synergies amongst the different organisations. The OIE is supporting public-private partnerships and is also actively participating in relevant projects carried out by IDF.

In parallel and in synergy with the development of standards and guidelines,

the OIE provides continuing support to Member Countries' Veterinary Services and laboratories, to enable them to implement these standards and guidelines. Furthermore, the OIE developed new tools to help Member Countries to update their national legislation in accordance with international standards, including marketing approval and control of veterinary products.

The OIE communicates all these activities through publications, international and regional conferences, and regional training workshops for OIE National Focal Points on veterinary products. These Focal Points are nominated by the OIE Delegates, and their tasks (conducted for each Member Country under the authority of the OIE Delegate) include: communication with and establishment of networks of authorities, stakeholders and experts on veterinary products, monitoring of legislation and the control of veterinary products.

Taking into account the experience gained from the training workshops organised for the OIE National Focal Points for Veterinary Products, the OIE has developed a questionnaire to gather information, at the global level, on the current practices employed by OIE Member Countries to monitor the quantities of antimicrobial agents used in animals.

The responses to the questionnaire will be presented at the **OIE Global Conference on the Responsible and Prudent Use of Antimicrobial Agents for Animals: International Solidarity to Fight against Antimicrobial Resistance**, which will be held in Paris (France) from 13 to 15 March 2013. Further information is available at the OIE Website (<http://www.oie.int/eng/A-AMR2013/introduction.htm>).

This Conference will, in particular, communicate the initiatives taken at the national, regional and international level by the OIE and other international organisations including IDF, to promote responsible and prudent use of antimicrobial agents in animals worldwide. It will favour further exchange of views and experiences of all relevant public and private parties and will allow the development of common recommendations.

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News from Member Countries

Swedish National Udder Health Campaign

The Swedish Dairy Association launched an udder health campaign in January 2012; Healthy Udders – 150 000 in the Bulk Tank

Introduction

Swedish farms have experienced a slow but continuous rise in somatic cell counts (SCC). The main reason for the farmers to pay attention to an increase in SCC is the loss of milk and thus of money. Recent studies have estimated a production loss

corresponding to 0.90 EUR per 1000 in higher SCC per cow year. (Hagnestam - Nielsen, 2009; IRL Herd Level Economic Analysis). This means that Swedish farmers, besides the quality payment, lost over 8 million EUR in the last 10 years because of increasing SCC, and still not

counting the quality payment. It is therefore important that veterinarians and as well as other advisors contribute in implementing routines aiming towards a decrease of the Swedish SCC. This will also promote animal welfare and longevity among Swedish milking cows.

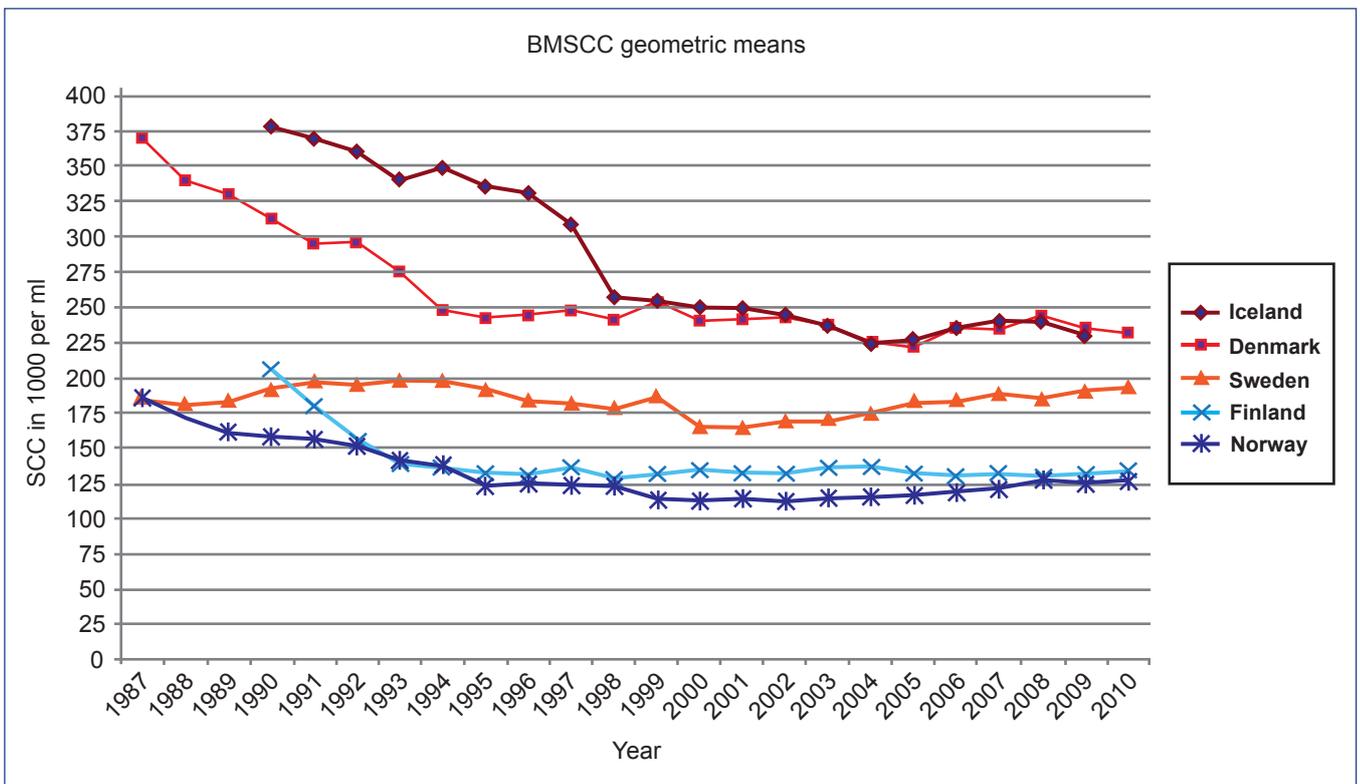


Figure 1. SCC in delivered milk in Sweden and other Nordic Countries 2001-2010.

State of the art

Farmers, advisors and veterinarians in Sweden tend to accept that larger new barns with or without robot milking have higher SCC. A multivariate regression analysis of the association between herd level SCC and herd factors also showed that there was a significant correlation ($p < 0.001$) with elevated herd level SCC in both AMS and large herds in Sweden (Mörk, 2010). Other herd factors that correlated significantly were Holstein breed and low yield, see Table 1. This is the outcome, but

is it really acceptable? Current literature indicates that few or no unknown risk factors have emerged in modern farming (Dufour et al 2010; Huijps et al 2009). The increasing SCC levels are instead the result of inconsistent and/or inadequate already known management routines.

The campaign

Overall purpose

- Turning the negative trend for udder health and SCC in Sweden
- Achieving an extremely high producing

Swedish dairy cow with excellent udder health

Normative goals

1. The BTSCC trend in Sweden should reverse during 2012, reaching a mean of 150 000 no later than 2020
2. BTSCC in AMS herds should reach the same levels as conventional milking during 2013
3. The mastitis treatment incidence should remain at the present low level of $\approx 15\%$ in Swedish recorded cows
4. 65 % of the heifers should remain healthy during their first lactation

Table 1: Different herd factors effect on SCC, Swedish recorded cows 2009 (Mörk, 2010).

Herd factor	SCC effect
Holstein breed vs. Swedish Red	+ 50 000
< 8 500 kg ECM vs. 9-400 kg ECM	+ 50 000
> 100 cows vs. 50 cows	+ 30 000
AMS vs. Tie stall	+ 16 000
Organic farm vs. nonorganic	n.s.

The campaign will start with focus on awareness, then go on to education and tools. The final step is on farm herd health advisory service, preferably performed within the herd health program Health Package Milk.

Awareness

The first 6 months of the campaign has been mainly communicative. Workshops were arranged by the Swedish Dairy Association during January and February all over Sweden, gathering around 1500 farmers about the subject. Also all service-technicians employed at the DeLaval

Company received live information at their yearly conference. In addition all graduating veterinary students, several dairy industries and veterinarians from the Board of Agriculture have taken part in spreading the key-messages in the project.

Introducing the Cell Count Emergency

Coming next in the autumn 2012 is the introduction of an open source web site for farmers, advisors and veterinarians. The targeted groups can log on and add present SCC, other herd facts and etiology. In return they will receive brief guidance

over actions that should be done primarily. The information presented will be basic but evident, consistent and clear. The principle is that actions for better udder health and lower SCC must be prioritized in an easily understandable way. This will bring higher acceptance and quality in the change of routines. A pedagogic aid for reaching this is a pictured pyramid consisting of ranked areas that need to be secured (Figure 2). To reach the higher levels in udder health you must start thoroughly with the basics. It is in this figure understood that the higher levelled actions will have less or no positive effect if the basic activities are lacking.



Figure 2. Example from *The Cell Count Emergency* – Mastitis Pyramid Contagious Bacteria.

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Nordic guide lines for mastitis therapy - Implementation in Sweden

The veterinary committee in the Nordic dairy industries (Animal Health group, NMSM) submitted prudent principles concerning mastitis therapy in Nordic milk production in 2009. The Swedish Veterinary Association (SVF), with 2500 veterinarians and veterinary students as members, has submitted a revised mastitis policy in May 2011 totally aligned with the Nordic Guidelines. This article briefly describes the guidelines and their influence on Swedish veterinary practice.

Antibiotic traditions in Sweden

Prudent use has been regarded as good veterinary practice in the country for decades and the first version of a national mastitis policy was submitted by SVF already in 1995. A mantra in the debate ever since has been: *the more we use them, the more we lose them*. There is a steady consensus in Sweden that antibiotics must be reserved for occasions when they are inevitable and indispensable for reasons of animal welfare. In recent years even more grist has been added to the mill since the "One Health" concept has become 'hot' on the political agenda.

The Guidelines

Principles

- Every mastitis case is a failure in the preventive work in the herd
- Prevention is far more ethical, safe and

cost effective than treatment

- Narrow spectrum substances will last longer and have better effect on sensitive bacteria
- All mastitis cases should be thoroughly analyzed and used in the herd diagnosis

General recommendations

- Only acute clinical cases should be treated during lactation.
- Subclinical mastitis should be treated using selective dry cow therapy. Penicillin G is the general drug of choice.
- Strictly restrictive use should be applied for cephalosporins and quinolones.

Before-treatment decisions

A comparison between the costs of culling vs. the estimated costs of treatment should be made.

Milk samples should be taken for microbiological identification. The results from the samples are important particularly for monitoring the mastitis pattern of the herd. Relevant biosecurity actions must be implemented within-herd to protect healthy cows in the herd. Supportive treatment such as non-steroidal anti-inflammatory drugs and fluid therapy should always be added when useful.

Antibiotics

Gram positive, β -lactamase negative

First choice: Treatment with Penicillin G*
Second choice: Supportive treatment, no antibiotics

Gram positive, β -lactamase positive

First choice: Supportive treatment, no antibiotics

Gram negative, E. Coli

First choice: Supportive treatment, no antibiotics

Gram negative, Klebsiella

First choice: Quinolones*
Second choice: Trimethoprim Sulfa*

*Supportive treatment should be added

Implementation

Swedish veterinarians live and learn

The mastitis incidence shows a continuous decrease to less than 15% 2010 (Figure 1). This is extremely low compared to a number of other European countries where incidences as high as 50 % are relatively common. There is also a continuous increase in the proportion of clinical mastitis cases treated with penicillin G, reaching 85% in 2010. The most restricted substances, cephalosporins, show a 30 % decrease in use for the last 3 years (Figure 2). Also quinolones have begun a drop and the use decreased by 4 % from 2009 to 2010.

Strict policy sustainable in Sweden

Resistance monitoring shows that more than 4 out of 5 cases of acute clinical mastitis in Sweden could be treated successfully with penicillin G. The abundant systemic use of penicillin G in recent decades has not resulted in an increase of β -lactamase Staphylococcus aureus strains in the country (Figure 3).

Further activities

An interactive roadshow has now started in collaboration with representatives from the National Veterinary Institute (SVA) and the Swedish Animal Health Service (SDHV). The goal of the workshops is an effective implementation and widespread acceptance of the policy among general veterinary practitioners.

The coming year will also include FOCUS – courses for farmers and their employees on the matter. The Swedish Dairy Association has produced updated educational material and will provide different advisory organizations with both support and subsidies for meetings arranged.

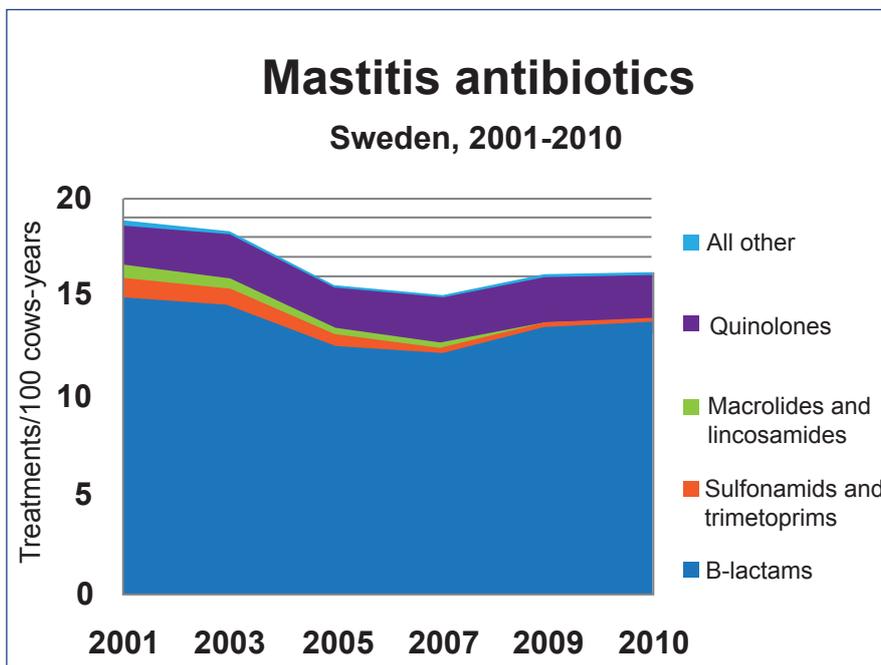


Figure 1. Antibiotics used in mastitis therapy in Sweden (Mörk, 2011).

Cephalosporins in Sweden, 2003-2010

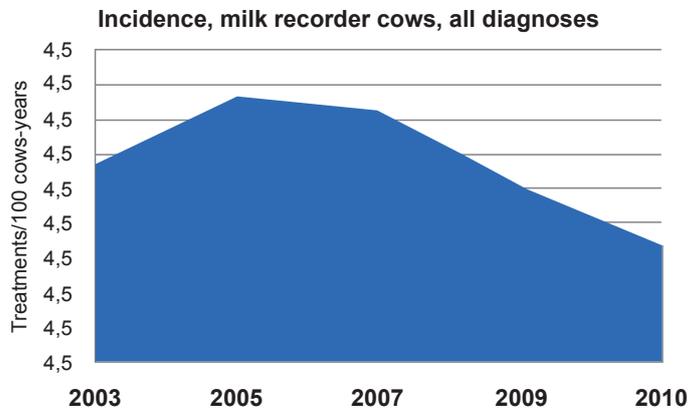


Figure 2. Cephalosporins, total treatment incidence in Sweden (Mörk, 2011).

Acute Clinical Mastitis in Sweden

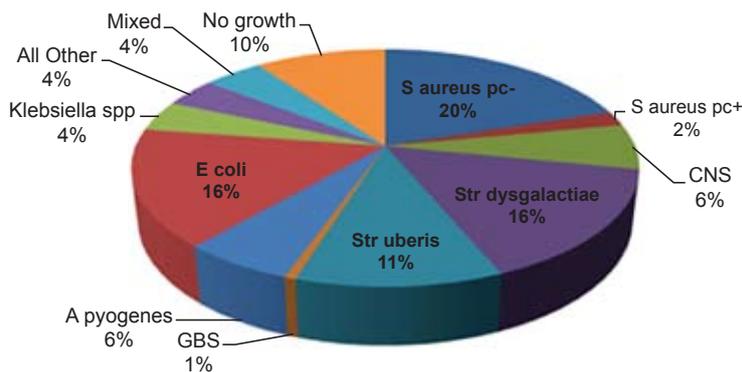


Figure 3. Etiology and resistance for acute mastitis in Sweden (Unnerstad et al 2009).

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Lameness

Development of an extension programme to reduce dairy cattle lameness in New Zealand

Healthy Hoof Programme (HHP)

In 2005, a group of dairy farmers, vets and lameness experts got together to tackle the issue of non-nutritional lameness in dairy cows. Lameness was not only an animal welfare concern but was costing farmers time and money. The knowledge existed on how to manage the physical factors causing lameness but this needed to be turned into on-farm action.

As a result, the Healthy Hoof Programme was developed. It translates existing knowledge on lameness into learning and carrying out best management practice on-farm. Supported by a set of easy-to-use resources (booklets, posters and DVDs), farmers worked with trained providers to identify the factors on their farm that

were influencing lameness. Training and a customised action plan then helped farmers and their workers to make changes on their farm.

Cows that become lame due to trauma are a significant issue for New Zealand dairy farmers. Lameness costs farmers in time and money, and can also negatively impact on staff retention. The incidence of lameness can vary from 5 – 50% in similarly designed and operated dairy systems. National lameness experts agree that it is physical trauma which tends to be the tipping point for causing clinically lame cows.

A project was designed to extend current knowledge and reduce the incidence of physically lameness. The project involved a 5 step programme branded as the Healthy

Hoof Programme (HHP). Pilot studies involving 10 farms in the first season and 30 in the second, ensured the HHP worked in practice. A tool kit of learning resources designed to meet requirements of large farm teams was developed to augment the HHP. There have been significant lessons learnt and refinements made during this development process.

The extension programme implemented on pilot farms has led to decreases in cow lameness and increased awareness of the issue due to improved farmer understanding, cow management and changes to infrastructure. The critical success factors for this extension programme to alter farmer behaviour and reduce lameness on farms have been the

use of a systematic approach highlighting priority areas, programme design to ensure practical application and provision of a support specialist to provide a consistent message and motivation to the farmer.

Introduction

Given the many factors that contribute to lameness, it is often very difficult for farmers, or their support rural professionals such as veterinarians, to identify exactly what the major causal factors are. Previous work in New Zealand dairy herds has concluded that physical factors are the leading cause of lameness in pasture based dairy herds (Chesterton N et al., 1989). In spite of the widely publicized findings of Chesterton et al, some farmers continue to struggle with lameness issues. Although farmers often state that they understand the signs that lead to increased traumatic lameness in their herds, many have failed to address them. A three year industry project was undertaken with the aim of assisting farmers' to reduce lameness by taking action and implementing current knowledge about reducing physically induced lameness.

Background to the Project

The project was undertaken by Business Developers at DairyNZ plus a team of key vets and farmers. It commenced in 2005 and was piloted during the 06/07 and 07/08 seasons. Farmer feedback shaped the development of the resulting Healthy Hoof Programme and the toolkit of resources that accompanies it. The project excluded any new research and focused solely on farmer uptake of existing industry knowledge.

During the first year of development dairy cattle veterinarians were surveyed to garner their ideas. They requested that a systematic approach be developed to deal with lameness. The project team also investigated what the key success factors were of existing extension activities relating to lameness on dairy farms throughout the world. In particular the Master Hoof Claw Care Programme (www.anka.com/english/Master_Hoof_Care_Technician_Program.htm) and the University of Bristol Lameness Control Plan (www.cattle-lameness.org.uk) provided excellent background information for the development team to consider.

During the second year of piloting, case study farms were chosen throughout New Zealand. The farmers submitted the names of their preferred support professional. The project team incorporated as many of the listed professionals as possible in the development of HHP. These professionals

have since become the first group of trained Healthy Hoof Providers.

What is the Healthy Hoof Programme and how was it developed?

1. Diagnosis and Action plan:

What happens?

A trained Healthy Hoof provider visits the farm, delivers the farmer toolkit of learning resources and carries out an assessment of the farm with respect to lameness and management at milking (using a template provided).

The farmer receives an action plan highlighting the priority factors likely to be causing lameness problems for their farm plus customised recommended solutions.

Development rationale:

During development of the Healthy Hoof Programme farmer feedback highlighted that it was very important that this diagnosis and action plan was carried out by a trained professional.

One solution does not fit all farms so it is important that practical and feasible actions are arrived at when working out an action plan for any one farm. This is completed in conjunction with the farm owner and manager. It is an integral part of HHP and also provides the farmer with confidence and motivation to make the changes required. Farmer buy-in to the actions is very important. Many of the farmers make their own excellent suggestions for action once the problems are clarified.

2. Skill Development

Part one: Prevention Training

What happens?

The Healthy Hoof provider visits the farm and delivers a training module about prevention of lame cows. The module has been specifically designed to provide interactive sessions and highly visual resources. Posters, worksheets, photographs and a DVD are used in the prevention module. During the module the provider facilitates a session where the farm team creates farm rules to be followed during milking. These are added to the poster provided. A contract is signed by all people working on the farm to help them acknowledge their responsibilities in the programme. Actions for future learning are identified for each person and some will go on to be trained in treatment of lameness.

Development rationale:

With the trend to increase farm scale in New Zealand the number of staff on a farm has increased. It is common for there to be in excess of 4 people working on an average farm and sometimes up to 20. The people who have the most impact on lameness caused by physical factors are those bringing in the cows and milking. Usually people in these roles are the most junior or inexperienced on the farm and often they are not given any training in stockmanship or cow flow. Poor cow flow can lead to less patient staff and more lameness. Due to staff retention problems farmers are also reluctant to invest in training for the people

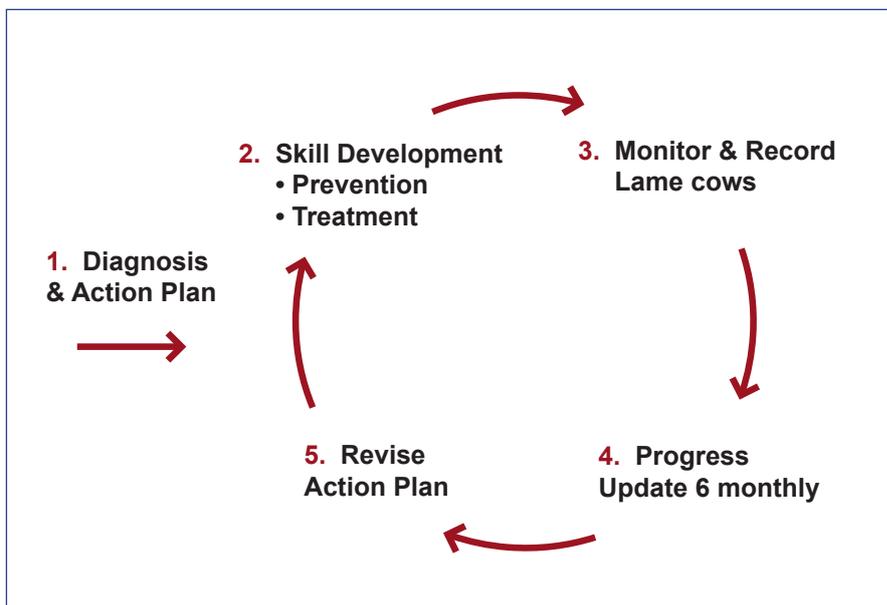


Figure 1. The Healthy Hoof Programme

in this tier. To overcome this the training is conducted by an external provider who actually visits the farm and conducts the training on-farm. Increasingly, such positions are filled by people new to New Zealand who have little or no experience in pastoral dairy farming and often speak little English. Previous surveys have also indicated a predominance of kinesthetic learning preference with those people choosing a career in farming. The prevention training module is therefore highly visual and interactive, the provider carries out the training with the whole farm team (including manager or owner) and it is undertaken at their own farm.

Part two: Treatment training

What happens?

One to three staff from one farm attend a treatment training module run by a veterinarian. This module covers care of equipment, safe restraint of cows and treatment of New Zealand's five major types of lameness. Approximately 8-10 people attend this training day, usually from various farms. A pocket sized weatherproof field guide is provided. This very simplified resource has been very popular with farmers.

Development rationale:

Most lame cows are treated on the farm by one of the farm team with the vet only becoming involved in treating the most severe lameness cases. Consequently it is essential that there are members of the farm team that are adequately skilled in lameness treatment.

3. Monitor and record lameness

What happens?

The farm team records lame cows and identifies the type of lameness (e.g. white line, footrot etc) in a very simple recording template. White boards with recording templates and photos have been popular resources especially for smaller farmers (200-400 cows).

The records are useful in identifying the predominant causes for lameness for the farm.

Development rationale:

Because lameness is the symptom of many diseases, the farmers must record the type of lameness for each cow. This helps build up a picture for the farm and can help lead to priority areas for solutions (e.g. predominance of white-line lameness may indicate excess pressure on cows in the yard (Chesterton N, 2006)).

Making the recording as easy as possible has helped with the number of farmers keeping records. The white board is mounted close to the treatment site and records are either transferred into the booklet provided or a digital photo can be taken and kept on file. Three quarters of farm case studies submitted their records after one prompt, others took more "persuasion". Provision of a specifically designed white board definitely helped to motivate farm staff to record lameness. All farm staff are involved in an exercise to explain the relevance of recording lameness information during the prevention training module. This also helps to get people recording.

4. Progress update 6 monthly

What happens?

Lameness records from each farm are summarized on a 6 monthly basis and the data compiled in an industry database. These records highlight any on-going problems or improvements in management relating to lameness. Larger farms record straight in to computers. A progress report is prepared by the provider and sent back to the farm.

Development rationale:

In order to motivate farmers to record information it is important for them to understand the value of the records. Interpretation of the data by a trained provider is central to the motivation process.

The six-monthly feedback target forces the farm team to reconsider their lameness situation and encourages staff to reflect on their actions.

5. Revise action plan

What happens?

At the end of the season a healthy hoof programme provider reviews farm progress with respect to lameness and discusses on-going actions for the farm. If necessary a repeat of the on-farm diagnostic is carried out. An updated action plan is provided for the new season.

Development rationale:

It is important to revisit the issue, to identify what is working and to address any recommendations that have not been successful in reducing lameness. Farmers can also provide valuable feedback which can then be incorporated back into the programme for the good of all farmers registered on Healthy Hoof. The action plan revision also serves to enhance farmer motivation and maintain the incorporation of "good habits" with regard to lameness.

Learning Resources Provided.

A suite of resources was also piloted by the case study farms. These were critically evaluated by the farmers and improved according to feedback. The toolkit includes:

- A Shed Rules and Staff Contract poster
- Locomotion Scoring Poster
- Recording White board
- Weatherproof field guide
- Folder including recording booklet, pull out booklets on identification and treatment of lameness, general guidelines to prevent lameness and hints to manage farm teams
- Links to purchase a DVD (produced by Neil Chesterton) are also provided

Five years on, Healthy Hoof still as relevant as ever

Lameness remains a key animal health and welfare issue on New Zealand dairy farms.

The DairyNZ Healthy Hoof Programme (HHP) helps farmers reduce herd lameness through improved management of cows and people, minimising physical damage to dairy cows' hooves.

The HHP is now in its seventh year being delivered on-farm by 80 trained Healthy Hoof providers. These providers are mostly vets, in addition to vet technicians, farm consultants and people in extension roles.

Lameness Scoring Video

DairyNZ has recently developed a Healthy Hoof Lameness Scoring Video.

The Healthy Hoof Lameness Scoring video will be available online from mid-May for farmers, vets and other rural professionals – visit dairynz.co.nz/lamenessvideo

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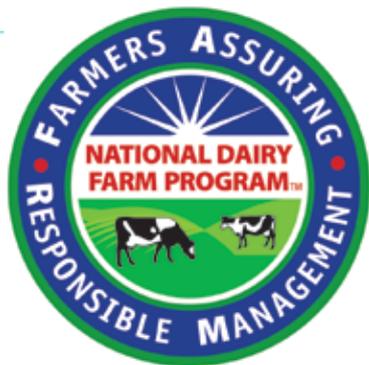
Thanks to Charlotte Glass from Dairy NZ for helping me to put this together.

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Third-Party Verification of a National Animal Care Program in the United States



Today's consumers in the United States want to know that the food they purchase is safe, wholesome and nutritious, and produced with integrity. The National Dairy FARM Program™ (FARM Program), established in 2009, is a U.S. based nationwide, verifiable animal well-being program providing thorough education, on-farm evaluations, and objective third-party verification. The program includes guidelines for best practices for all areas of production including animal health, environment and facilities, animal nutrition, and transportation and handling. The data

collected by the FARM program offers a quantifiable validation that U.S. dairy farmers are meeting their ethical obligation for on-farm animal care. The 2011 third-party verification of the FARM Program was successfully completed in May 2012. Third-party verification analyzes the performance of the FARM program and demonstrates the validity and integrity of the program.

In early 2011, the National Milk Producers Federation (NMPF) contracted with a statistician to develop a strategy for maximizing the program benefit of verification testing and to develop a methodology for selecting farms for the verification tests. The result was an algorithm that utilized distinctive factors of housing type, herd size and evaluator experience. The finalized statistical algorithm grouped farms into 36 distinct profiles for which three farms of each type are randomly selected for the verification process. NMPF then identified a third-party vendor through a request for proposal process and selected Validus Services, an ISO 9001:2008 Certified company, based in Des Moines, IA. The International Organization for Standardization (ISO) is

the world's largest developer and publisher of International Standards. ISO certification aims at guaranteeing the effectiveness of the organization.

There were two main goals in the initial verification of the FARM program – whether the statistical sampling model used to verify the program worked and whether the evaluator data was consistent with the verifier data. The findings confirmed the verification strategy as designed is sound and determined there was no significant difference overall between second-party evaluators and third-party verifiers. On-farm third-party verification began in September 2011 and was completed in December 2011. Third-party verification is an annual process and is scheduled to begin again in July 2012.

A more complete report on the third-party verification findings will be made at the World Dairy Summit in November. For more information on the National Dairy FARM Program visit www.nationaldairyfarm.com.

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Eradication of bovine ringworm caused by *Trichophyton verrucosum* in Norway

Bovine ringworm caused by *Trichophyton verrucosum* is a notifiable disease in Norway. Control campaigns executed during the last 30 years, and followed up by an eradication campaign since 2003, have been successful. Before 1980 approximately 800-1000 newly infected herds were reported yearly all over the country (Figure 1). This level of newly infected herds was constant despite restrictions on trading live animals from infected herds. From 1979 a new vaccine against bovine ringworm was introduced in Norway. Vaccination has been proved to be an effective control and eradication tool (Gudding et al. 1991; Gudding & Lund, 1995). After ten years of systematic vaccination in infected herds, as well as neighbouring herds having contact with infected herds on common pasture etc., the rate of new infected herds was down to approximately 150 each year (Figure 1). Gradually more and more counties were identified free of bovine ringworm caused by *T. verrucosum*. By the year 2000 there were only a few infected herds with new restrictions in the counties of Oslo and Akershus, Oppland, Telemark and Rogaland (southern part of the country) (Figure 2).

Some scientists therefore put forward the hypothesis that it should really be possible to eradicate bovine ringworm caused by *T. verrucosum* from Norway (Lund et al., 2003). Eradication of bovine ringworm would be a great benefit for Norwegian cattle farmers and no longer be a cause of ringworm in people, which was very common during the 1960's and 1970's. Such eradication would also be a benefit for quality of hides, as ringworm makes marks on hides.

Restrictions to limit spread of infection and vaccination have been key elements in the strategy. However, during the autumn and winter months of 2002 and 2003 ringworm re-emerged and spread to about 30 herds in a few densely populated municipalities in Rogaland county (South-west part of the country) and also to the neighbouring county Vest-Agder. The "End-phase project of bovine ringworm" was established as a mopping up strategy. Members of the project group included the Norwegian Cattle Health Services/TINE Dairy SA, Animalia (Meat and Poultry Research Centre of the Norwegian Meat Industry), the Norwegian food safety authority and

the Norwegian veterinary institute. A veterinary surgeon working in Rogaland was recruited on a part-time contract by TINE to work with the end-phase project. The end-phase project organized a targeted program to eradicate bovine ringworm in a 3-4 year period lasting from 2003 to 2007, but the main activities still continue. Priority was given to lifting herd restrictions by early detection and rapid response to limit spread and eradicate ringworm from infected herds. During the two first years of the end-phase project, restrictions were lifted in 28 herds in Rogaland county and 9 herds in Vest-Agder county. Restrictions were lifted in an additional 15 herds in Rogaland county from 2008 to 2010. The ringworm outbreak in Vest-Agder county was managed effectively and in 2-3 years no herds had restrictions. The number of new infected herds decreased substantially during the end-phase project. The goal of a ringworm free cattle population in Rogaland county was achieved in the course of 2011, after the only four herds remaining with restrictions in this county for years, finally were found to be ringworm-free. In addition, there is one herd in each of the counties

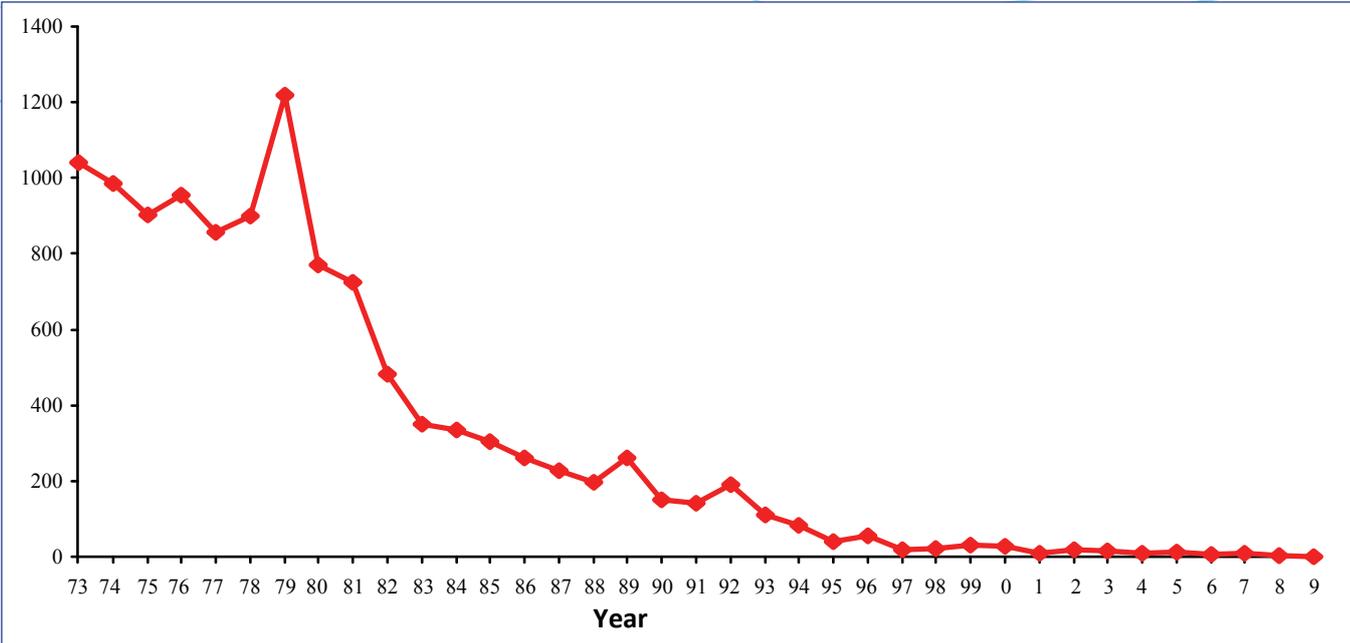


Figure 1. Number of new herds with restrictions each year during the period 1973 to 2009 in Norway. There was a milestone during 2009 with no new herd infected. At present (summer 2012) there is only one beef herd with restrictions

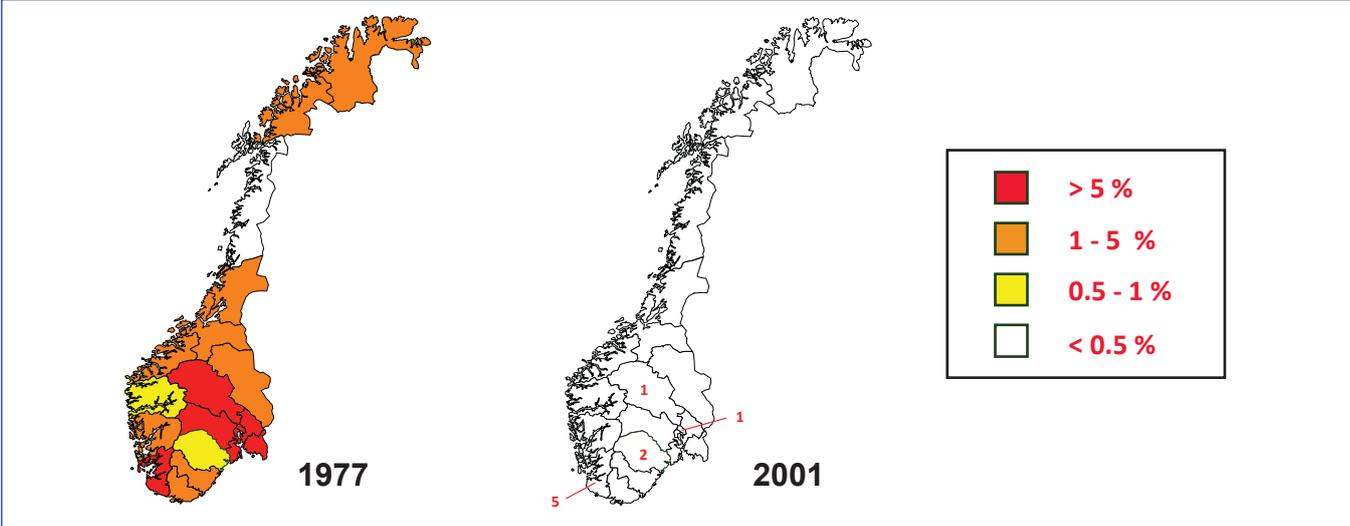


Figure 2. Incidence of new herds with restrictions due to bovine ringworm in cattle during 1977; and number of herds with new restriction during 2001 within each county of Norway.

of Vestfold and Vest-Agder (by September 2011) with restrictions. At present (summer 2012) there is only one beef herd (Vestfold) with restriction on bovine ringworm due to *T. verrucosum*. Last year there were two herds suspected for bovine ringworm, however the diagnoses turned out to be *T. equinum*, which also could result in some symptoms in bovines. Thus at present no milk producers have bovine ringworm in their herd in Norway. The key points in the program have been vaccination of young stock as well as cleaning up the

barn with washing and disinfectants. Close supervision by the Norwegian food safety authority has been established to limit spread and eradicate the disease from the remaining herds with ringworm.

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Future meetings and reports of past meetings

Heifer International, an NGO with 70 Years' Experience, to present in the Emerging Economies Conference at WDS 2012 in Cape Town South Africa



Heifer International (Heifer), a development organisation with almost 70 years experience assisting smallholder farmers, will be presenting for the first time at the IDF World Dairy Summit.

Heifer's mission is to end hunger and poverty while caring for the earth. As of 2011, Heifer has helped 15.5 million families in more than 125 countries move toward greater self-reliance. Heifer is currently working in 40 countries globally, including many countries in Africa. In the Southern Africa region, Heifer has a presence in South Africa, Malawi, Zambia and Zimbabwe. In South Africa, Heifer is represented by Heifer International South Africa, with a footprint of over 80 community groups empowered in the Eastern Cape, KwaZulu-Natal and Limpopo, including numerous dairy projects.

Heifer's model involves assisting new and emerging farmers with intensive training and support, as well as providing high-quality livestock and agricultural inputs and ensuring that they are able to care for these animals. Through the introduction of improved farming methods and high-quality stock, productivity can be increased, allowing farmers to provide food for their families and generate income. Heifer also assists farmer groups to access markets and work with other value-chain actors.

As well as working at the grassroots level, Heifer engages in advocacy and policy dialogue in support of small scale farmers. In this way, sustainable poverty alleviation can be achieved in the rural areas of South Africa, as well as in other countries.

Although Heifer also works with other livestock, depending on the environmental and climatic context and the needs of the group, dairy has proved particularly successful as a poverty alleviation strategy for poor, rural people. Small-scale dairy producers first provide a much-needed source of protein for family members, particularly for young children, pregnant women, immune-compromised individuals and the elderly. In South Africa alone, over 20% of children face stunting, partly as a result of protein-poor diets. Daily milking ensures a supply of protein that is secure and reliable. Animal waste is also used to grow vegetables, further improving the health and food security of project families.

Dairy is an ideal income-generating choice for smallholder farmers because it shows reliable demand and is much more easily bulked and combined than some other products. In Heifer's model, each farmer is trained and supported to produce milk at his or her homestead and on a small scale. The milk is brought to a central point to be collected. This ensures that each farmer is able to manage a small number of animals. Individual farmers take responsibility for the quality of milk and the care of animals.

A zero-grazing or cut-and-carry approach is used to safe-guard the health of animals and to improve productivity. The farmer group also plays an important role for these small-scale farmers. Through the group, farmers are able to access affordable agricultural inputs of higher quality through bulk buying. The group also provides an access-point for farmers to sell their produce. Because groups are better able to interact with buyers and processors than individual farmers, farmers get a better price for their milk and processors and buyers are guaranteed a more reliable supply.

Increased productivity and improved market access allow farmers earn a living through small-scale dairy production. Income is used to support family expenses, such as school-books and healthcare, or reinvested to further grow the small farming business

Experience in Africa and further afield suggests that dairy production is both a successful poverty alleviation strategy and a viable business opportunity for small-scale and emerging farmers. Come and hear Heifer International CEO, Pierre Ferrari, speak during the World Dairy Summit about Heifer's experience with working with over 160 000 small holder dairy farmers in East Africa and meet other representatives of the organisation, including CEO of Heifer in South Africa, Marisia Geraci. Heifer's presentation is titled Building Social Capital: Engaging Smallholder Farmers as part of the conference session on Benefits of Dairy for Emerging Economies.



Animal Health and Welfare conference at WDS 2012



FIL-IDF WORLD DAIRY SUMMIT & EXHIBITION
SOUTH AFRICA 2012
 A WORLD IN ONE COUNTRY

The theme of the Animal Health and Welfare Conference at the World Dairy Summit to be held in Cape Town, South Africa from November 4 to 8, 2012 is “Animal Health and Welfare at the Interface”. The OIE is the global reference organisation for animal diseases and we are honoured to have Elisabeth Erlacher-Vindel as chairperson for the first session. The theme is “Diseases at the wildlife-dairy animal-human interface” and the keynote speaker, Dr Bruckner, sets the tone with a suggestion that compartmentalisation may be useful in protecting dairy animals from diseases such as Foot and Mouth, where there are wildlife carriers. This is not only applicable to Africa - even in Europe wild boars could be implicated as a reservoir. Roy Bengis, who is a wildlife expert seldom seen at dairy conferences, will also give a fascinating talk on diseases transmitted from wildlife that could threaten the dairy industry and comes with thought-provoking suggestions for prevention. Elizabeth Berry, well known in IDF, will update us on the role of badgers in bovine

TB in Britain. The third speaker, from the University of Pretoria, is Anita Michel, recognised as an international expert on bovine tuberculosis and she will speak about the predator-prey relationship that perpetuates BTB in lion and buffalo and present new work on the risk to dairy cattle.

The second session will focus on dairy animal welfare at the interface and the keynote speaker, Luc Mirabito, will explain the newest decisions and developments in regard to the OIE guideline in livestock welfare. Beniamino Cenci-Goga, from Perugia University (Italy), will discuss how EU regulations could impact on the welfare of dairy animals and Henk Hogeveen, chairperson of the Animal Health and Welfare group of the IDF, will be giving a perspective on how good dairy animal welfare leads to improved economic outputs. The successful implementation of a new way of auditing dairy cow welfare in the USA will be presented by Jamie Jonker.

The third session will focus on production diseases and maintaining health in the dairy herd. Fatah Bendali from CNIEL (France) will update us on preventing Johne's disease through calf management strategies and Bruno Garin Bastuji will be explaining why brucellosis is re-emerging as a zoonosis of concern in Europe and Africa. For the first time, we will also be looking at the role of internal parasite control in dairy cattle and Andrew Forbes from Merial will discuss the risk and control of Ostertagia.

There will be two presentations on mastitis, both focussing on zoonotic pathogens at the human-dairy animal interface. Prof Lusato Kurwijila will present interesting details on management to prevent *Staphylococcus aureus* in Tanzanian dairy herds and Inge-Marie Petzer, from the University of Pretoria, will present novel findings on pathogens at the human-dairy cow interface.

This exciting programme has focussed on attracting experts from all over the world and you should not miss it. Cape Town is an exciting venue and you can get all the details on the website www.wds2012.com.

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