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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Contents

PhD Reports

Methane production in dairy cows – impact of feed and rumen microbiota

Ruminants are unique in their ability to utilise feeds rich in cellulose, due to the great diversity of microorganisms that break down feed in the rumen of the host animal. Microorganisms break down complex compounds by hydrolysis to produce volatile fatty acids (VFA), mainly acetate, propionate and butyrate, which are used as energy for the cow. At the same time as VFA sare produced, varying amounts of methane (CH_4) are produced by methanogenic Archaea. Methane is not used by the cow itself, instead it is released to the atmosphere as a potent greenhouse gas. Approximately 40% of agricultural sector emissions derive from enteric CH_4 production by ruminants. Levels of CH_4 production vary according to feed type, feed intake and even among individual animals raised under similar conditions, but the underlying mechanism is not well understood.

The thesis describes four different studies to evaluate the effects of feed, feed additives and rumen microbiota on CH_4 production by dairy cows and also in a gas in vitro system (Fig. 1). In study 1, different forage proportions were fed to cows for evaluation of the effect of more fibre-rich diets. Methane production was measured and also the methanogenic population in the rumen. Results showed that the variation between cows was stronger than the effect of diet for both CH_4 production and methanogenic population when two different levels of forage proportion were fed. The results in study 1, where the CH_4 emissions seemed to be related to individuals rather than diet, and those in other studies, where individual variation in CH_4 production has been shown, prompted further investigation of the relationship between CH_4 production and microbiota in individuals. This was performed in study 2 by selecting animals with persistent low or high CH_4 production over the study period (three months) and by reducing the impact of certain physiological and dietary parameters by choosing cows in the same lactation stage (mid-lactation) and being fed the same diet. The results showed that the microbial flora from individual cows clearly belonged to one of two clusters of bacterial operational taxonomic units (OTUs). A similar, but less segregated, pattern was shown for Archaea. One of the clusters correlated with comparatively high CH_4 production than the other. Differences were observed in VFA proportions between communities, but not in fibre digestion or milk production. This indicates that selection of cows producing low methane might be carried out without affecting feed digestion or milk production.

In the third study, the additives cashew nut shell extract (CNSE) and glycerol were tested in a gas in vitro system for their ability to reduce CH_4 production. Additives were added to a substrate of forage and concentrate in a ratio of 60:40. CNSE reduced CH_4 production by 18% and had a strong impact on microbiota, whereas glycerol increased CH_4 production by 12% and had less effect on microbiota compared with the control. Comparison of microbial composition in the inoculums from the in vitro control and donor cow before incubation revealed that the bacterial communities were relatively similar. However, the relative abundance of some species in the archaeal population changed. This difference between systems should be considered when evaluating in vitro data. In the fourth study, the gas in vitro system was evaluated by comparing predicted and observed CH_4 production for 49 test diets and showed an overall good relationship, with small root mean square error for prediction (12.3% and 9.5% of observed mean for fixed and mixed models, respectively). However, the in vitro system had limitations in predicting the effect of concentrate proportion on CH_4 production.

Figure 1 Gas in vitro system for measuring total gas and methane production

In conclusion, the results described in this thesis show that individual differences in methane production are greater than the effect of feed. Addition of CNSE reduced CH_4 production in vitro but should be further evaluated in cows. Different methanogenic species showed a correlation with methane production, which indicates that different environments are favourable for the different groups. Depending on the rumen environment, more or less methane was formed, but no effect was shown for either milk or feed use in a study of cows with low and high methane production. Increased knowledge of what actually happens in the rumen would provide better information about what can be done to reduce methane production.

This report gives a summary of the project, but the full thesis is available from http://pub.epsilon.slu.se/13308/[2].

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Other Research

Impact of the selective use of an internal teat sealant material to improve udder health in the Israeli dairy herd

The research spanned a period of two years in a commercial dairy farm (approximately 280 cows are milked). The cows that reached 'dry-off day' had each individually undergone the following preliminary examinations: somatic cell count (SCC), clinical infection events and milk retention events, any injuries and sphincter defects in the teat, California mastitis test (CMT), and microbiological sampling of the milk to diagnose pathogens. Definition of the status of the cow in accordance with the findings was either as 'healthy' or 'irregular'. Four different treatments were prescribed: no treatment; provision of a teat sealant only (Orbeseal®); 'dry-off' antibiotic treatment as in standard use; and a combination of antibiotics and teat sealant. In total, 282 cows entered into the study, where the results of 38 cows were from two successive lactations. On the dry-off day, 90 cows were defined as 'healthy' (32%) in accordance with the stringent metrics examined. Most of these were from heifer's cows (75%) and the remainder from adults (2+ calving). Of the cows defined as healthy', it was found that prevention of new infection during the dry period and the recovery rates after calving were similar in untreated cows as in those treated with antibiotics alone or with a teat sealant only. In the group defined as 'irregular', 192 cows (68%) were diagnosed, and received one of two different dry treatments. Some received the treatment in common use in the sector (Nafbenzal®), whereas the others in this group received the existing treatment plus addition of a teat sealant (that is, two insertions into the teat). In the 'irregular' cows, it was found that the integrated treatment of antibiotics and teat sealant increased the chance of preventing new infection fivefold and raised the chance of recovery by 2.4 compared with those treated with antibiotics alone.

This paper introduces the possibility of making a judgment and choosing from alternative dry period treatments according to the findings and real-time results of each herd separately at the level of the single quarter. The breeder can determine the status of the cow, udder or quarter as 'healthy' or 'irregular' and then decide which of the different treatment options to use, including no treatment. This system does require the preliminary collection of historical data about the cow, clinical examination of the udder and sampling prior to and after drying out. However, it allows selective treatment, a dramatic decrease in the use of antibiotics (25%) and, above all, continued maintenance of udder health and public health.

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Field trial with an internal teat sealant in a high producing milking herd in Sweden

Introduction

Some intra-mammary infections (IMI) in dairy cows are initiated during the dry period. Formerly healthy cows at dry off can thus start their next lactation with clinical or subclinical mastitis. Several reports from other countries have concluded that the use of the internal teat sealant Orbeseal® (Boviseal® in Sweden) could effectively reduce IMI at next parturition [1].

Hypothesis

The administration of Boviseal® to healthy cows in accordance with the manufacturer's recommendation at dry off could increase yield and reduce the prevalence of clinical and subclinical mastitis during the first part of the following lactation.

Material and methods

Data in the analysis

Evaluation was carried out using the documentation in the Swedish cow database at Växa Sverige. Somatic cell count (SCC), yield, survival, genetics and calving registrations at the cow level were extracted for all cows in the herd during the trial period.

Description of the herd and the protocol

The trial was performed between 21 June 2011 and 2 November 2012 in a herd with 450–550 cows[1] (89% Holstein). Consistent dairy herd improvement (DHI) sampling on all cows was conducted 12 times per year. The herd manager was instructed to identify and register all cows with a geometric mean for SCC of less than 200 for the last three months prior to dry off. Cows with even numbers were treated with Boviseal®**,** whereas cows with odd numbers were used as a control group in the trial.

Study design

SCC, mastitis and milk yield were evaluated in the final analysis.

The first six DHI tests after calving were used to analyse the SCC after calving. The SCC at the three last DHI tests prior to dry off was used to estimate udder health status (see above). The yield was calculated in kilograms of milk using the results from the 1st to 6th DHI test days after calving.

Subclinical mastitis was defined as SCC ≥200,000/ml milk and was calculated for all DHI test days. Subclinical mastitis during evaluation was defined as SCC ≥200,000/ml milk at any of the six following DHI tests after calving. Milk samples were collected when clinical or subclinical mastitis was suspected and cultured at NVI Uppsala. Sample results were continuously documented in the cow database.

Results

Descriptive statistics

A total of 111 (45.5%) cows in the trial were treated with Boviseal® and 133 (54.5%) were included in the control group. The distribution of cows regarding parity and breed were similar in the two groups. The SCC at dry off was also similar for treated and untreated cows.

Figures 1 and 2 show SCC and yield at the 1stto 6th DHI test days for both groups. Figure 3 shows the proportion of cows with subclinical mastitis for treated and control animals. A total of 42 milk samples from 40 different cows in the trial were cultured during the first six months of lactation as a result of suspected clinical or subclinical mastitis. Of these cows, 21 were treated with Boviseal® and 19 were untreated (control group).

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[1] The herd was expanding during the trial period.

Summaries of Other Projects

Seminar held to emphasize the 'One Health' approach in brucellosis control

Bovine brucellosis not only causes serious economic loss in dairying in India, it is also a serious public health issue, with the working capacity of the farmer being seriously affected as a result of its zoonotic potential. Realizing the importance of dealing with control of brucellosis holistically, the National Dairy Development Board (NDDB) initiated a pilot project in 2013–2014 in Kutch district, Gujarat. The pilot project currently covers 140 villages. The specific areas of focus in the pilot study are awareness creation; calf hood vaccination and identification of vaccinates through ear-tagging; disposal and disinfection methods; and identification of animals and humans suffering from the disease through a sequence of tests. Standardization of sampling using Flinders Technology Associate (FTA) cards has provided an easy system for transportation of suspected samples from animals to the laboratory without a cold chain using ordinary post, even from the remotest villages.

Under the aegis of the project, a seminar on ‘Brucellosis and its zoonotic significance’ was also organized. The main objective of the seminar was to create an awareness of the zoonotic significance of brucellosis, especially among doctors operating in the project area, and to promote a holistic approach to brucellosis control by bringing together all the stakeholders (doctors, veterinarians, paraveterinarians, policy makers etc.) and emphasizing the need to work together to control the problem of brucellosis, both in humans and animals.

The Kutch district panchay at president, president of the Indian Medical Association(Kutch), District Medical Officer, District Animal Husbandry Officer and officials from organizations such as the National Institute of Occupational Health (NIOH) and the Indian Council of Medical Research (ICMR) participated in the seminar along with 49 medical doctors and 51 veterinarians and paraveterinarians of the district.

Dr. B. G. Mantur, a pioneer on human brucellosis in India, was invited to deliver lectures, especially to inform the medical doctors on the zoonotic significance of brucellosis, its diagnostic challenges and specific treatment protocols. The seminar also created links between medical doctors, veterinarians and the producer companies implementing the control project so that the holistic ‘One Health’ approach being advocated by WHO, FAO and OIE could be put into practice in the pilot project. A sero-sampling camp was also held at the venue jointly by the Gujarat Animal Husbandry Department and NIOH. Around 45 participants, mainly veterinarians and livestock inspectors, provided their blood samples for testing.

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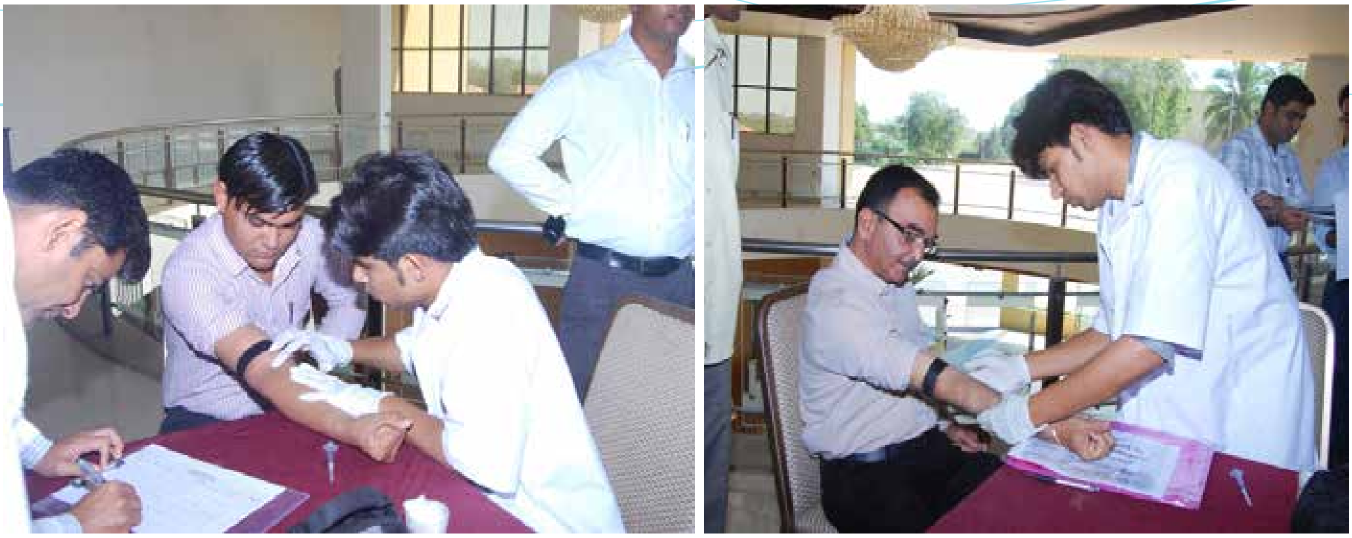
Inauguration of the seminar on ‘Brucellosis and its zoonotic significance’



Sero-sampling from paraveterinarians and veterinarians by NIOH officials for brucellosis testing

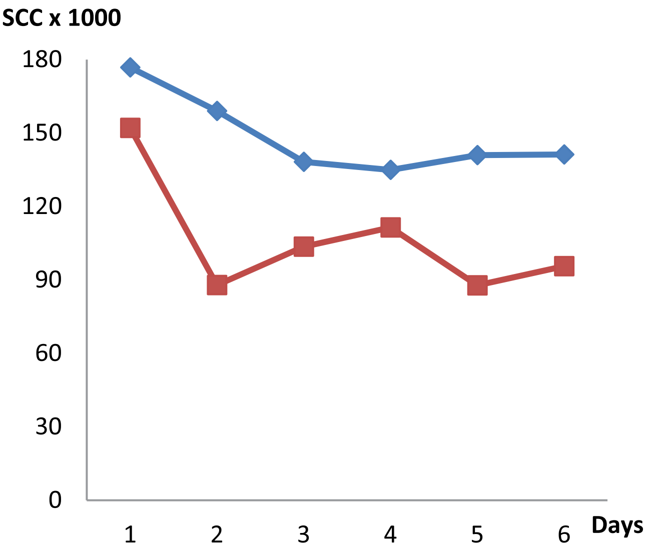


Figure 1 Somatic cell count between the 1st and 6th DHI test days after treatment with Boviseal® (blue). SCC for control animals is shown in red

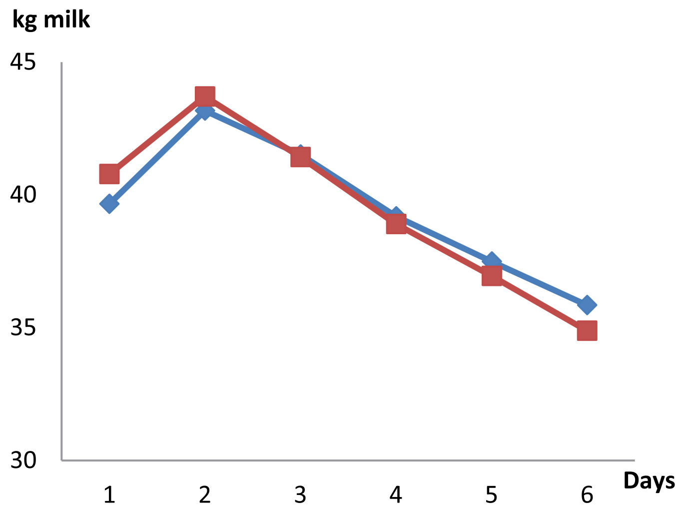


Figure 2 Yield between the 1st and 6th DHI test days after treatment with Boviseal® (blue). Yield for control animals is shown in red

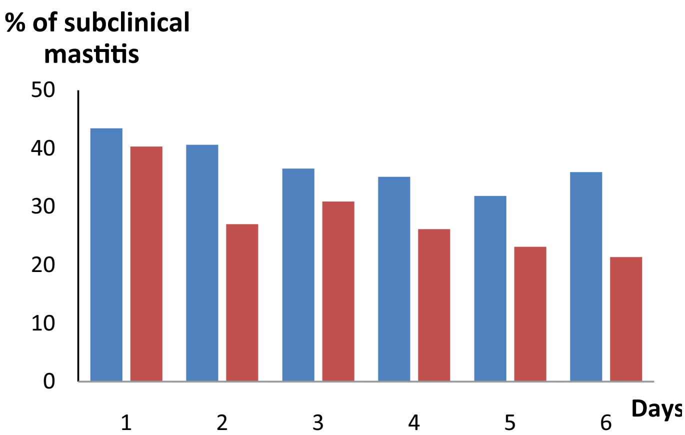


Figure 3 Proportion of cows with subclinical mastitis between the 1st and 6th DHI test days after treatment with Boviseal® (blue). Proportion for the control group is shown in red

Statistical interpretation

Cows treated with Boviseal® had a significantly higher SCC at test days two and five after calving (p=0.01 and p=0.01, respectively). The yield did not differ between the groups on any of the test days.

The risk of subclinical mastitis on DHI test days 1–6was the same in both groups, whereas the risk of clinical mastitis was three times higher for cows treated with Boviseal® (p=0.02).

The Norwegian BRSV and BCoV control programme

Introduction

Norway is free from bovine viral diarrhea (BVD), infectious bovine rhinotracheitis (IBR) andenzootic bovine leukosis (EBL) and has never detected *Mycoplasma bovis* in survey nor from clinical cases. The most important infectious diseases in dairy cattle are at present bovine respiratory syncytial virus (BRSV) and bovine corona virus (BCoV). Preliminary data and estimates from TINE Advisory Services[1] show that these diseases have an annual cost of 100–130 million NOK (or approximately 10–13 million Euros) in a population of 8500 dairy herds and 5000 beef herds. A preliminary national survey of bulk tank milk showed a national prevalence of BRSV-positive herds of 53% in 2012/2013 A similar figure of 41% was found for BCoV. A new survey of bulk milk samples in March 2016 indicated an apparent prevalence of defined BRSV-positive samples of 53% and an increase in BCoV to 77%. There is a huge difference between regions for both diseases. A control programme should be highly beneficial economically.

Material and methods

The main element of the proposed control programme is to map positive and negative herds and inform the farmers about their status. Negative herds (called 'green herds') have to ensure their biosecurity. Thus, re-infection from positive herds is avoided. Most important is to avoid buying live animals from positive herds (red herds) and avoid transport of live virus via personal contact with other farmers, vets, AI-staff, claw trimmers, technical service staff, etc. The mapping of dairy herds is based on the results of bulk milk sampling. Herds that have not had BRSV nor BCoV for several years are negative and can be characterized as green. Herds that test positive on bulk milk must test their first lactation cows. Those that have not had BRSV nor BCoV for the last two years are negative; those who test positive are classified as red. In beef cattle, the mapping of herds is done directly by taking blood samples from young stock aged between 6 months and 1 year. Those that are negative are marked green and those that are positive are marked red. This status has to be fresh and lasts for a few months before retesting is necessary. If there is trade of animals from a red or unknown class of herd to a green herd, the green herd has to be resampled to retain its green status. An intensive information campaign has to be put in place, especially for the green herds.

Results

Results from a preliminary survey at the University of Life Science, Oslo[2] show that the dynamics between herds are at present very fast. As an example, about 35% of the positive herds become negative within the space of one year. On the other hand, about 42% of negative herds are transformed into positive herds within one year. Putting these figures into a Markov-chain spreadsheet illustrates that this dynamic makes up a stable prevalence in the whole population. This spreadsheet also illustrates that if the 42% conversion from negative to positive herds is reduced to 10%, the prevalence will drop from 54% to 22% within 2–3 years. The same simulation model shows that an increase in the proportion of herds going from positive to negative would not have as much influence on the overall prevalence. This demonstrates that the key focus area should be to prevent new introduction in non-infected herds. This would obviously also has an impact on already infected herds because it would prevent new infection. This programme has to be carried out without vaccination, because vaccination would result in misleading information on the infectious status of herds.

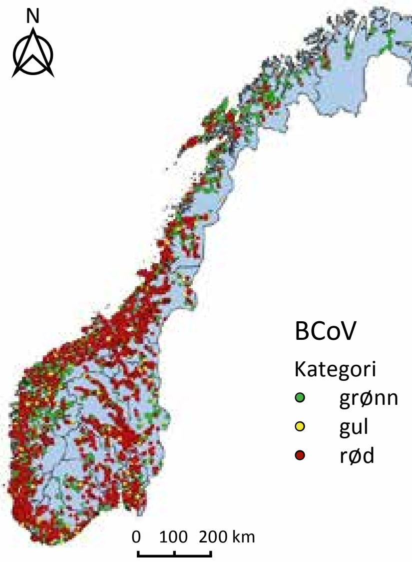


Figure 1 Apparent positive bulk milk samples (red) for BCoV in Norway in March 2016. Negative herds are marked in green. (Map made by Ingrid Toftaker, University of Life Science, 2016)

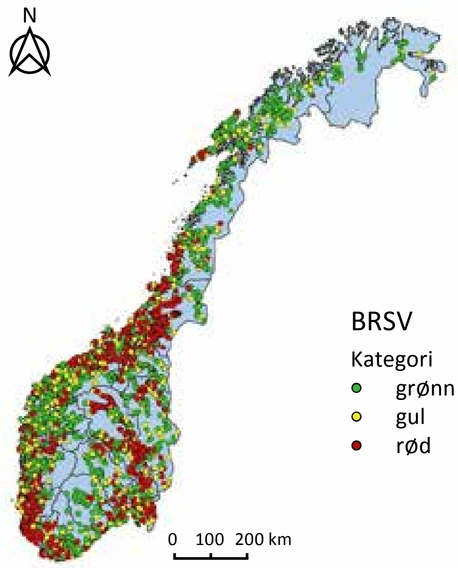


Figure 2 Apparent positive bulk milk samples (red) for BRSV in Norway in March 2016. Negative herds are marked in green. (Map made by Ingrid Toftaker, University of Life Science, 2016)

Conclusion

A preliminary benefit–cost estimate with uncertainty illustrates a possible benefit in more than 5.8% of all scenarios, and a most probable net present value (NPV) after 10 years of 260 million NOK (26 million Euros) and a maximum NPV of 530 million NOK (53 million Euros). The benefit/cost ratio was 2.5–3.0 and the internal rate of return 80–100%. This shows that such a programme will most probably be very beneficial, not only economically, but also from the point of view of animal welfare. The industry will start a full-scale national programme during the autumn of 2016.

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Workshop on development of udder health control programme in dairy cows in Bangladesh

Mastitis is one of the major problems for the dairy sector throughout the world. Dairying in Bangladesh is an emerging sector because of the huge demand for milk for consumption, employment opportunities for youth, and empowerment of women. As in other parts of the world, mastitis is an obstacle to expansion of the dairy industry in this country. Mastitis control programmes have been developed and implemented in developed parts of the world under different names [1-3]. However, no such programme exits in Bangladesh or other developing countries. So, our three-year Swedish government-funded project is underway to develop an Udder Health Control Programme (UHCP) tailored to the situation in this country. The aim is to support the dairy sector in production of milk and to improve the quality of life of rural marginal people.

One of the activities of the project, a workshop on mastitis control in the developing world, was held on 31 May to 1 June 2016at Chittagong Veterinary and Animal Sciences University (CVASU) in Bangladesh. This workshop provided a platform for an encounter between existing knowledge on udder health control and the practical challenges that small-scale dairy farmers in developing countries are facing. The objectives of the workshop were (i) to bring practicing veterinarians and dairy practitioners together to share their problems, opportunities and ways to improve the situation through consultation with international and national experts; (ii) to collect and summarize existing knowledge on mastitis control by searching the literature and listening to expert opinions; (iii)to identify the gaps in information needed to implement the known control measures in this country and to fill these gaps through field research.

The workshop was attended by dairy practitioners from government and private facilities; dairy farmers, researchers and academicians from veterinary schools in Bangladesh; and experts from India, Sri Lanka, Bhutan, Myanmar, Malaysia, Kenya, the Netherlands, Sweden and France. Invited renowned mastitis experts provided useful and necessary knowledge on mastitis to the participants, which will be of direct and great benefit in their future practice and research. During the workshop, small group discussion meetings and panel discussions were organized, in which the available knowledge was challenged by veterinary practitioners, in particular from Bangladesh. These encounters helped identify the gaps in knowledge that prevent the implementation of known mastitis control measurements in Bangladesh.

A field trip was also arranged to observe a small-scale dairy set up in Bangladesh, to have a conversation with farmers, and to observe the overall management and production operation systems. Udder health specialists, Prof. Theo Lam from Utrecht University, Dr. Ylva Persson from the National Veterinary Institute Sweden, Dr. Gerrit Koop from Utrecht University and Dr. Marjolein from INRA, France participated in the trip. Prof. Yeh Tut Aung of the University of Veterinary Science, Myanmar and Dr. S. B. Chamling Rai of the National Center for Animal Health, Bhutan participated in the field trip. The trip was led by Dr. Md. Farhad Hossain and Prof. Dr. Md. Mizanur Rahman. The trip gave the experts a snapshot of the dairy sector in this country, which will be helpful in formulating the UHCP.

The workshop inaugural session was chaired by Prof. Abdul Mannan, Chairman, University Grants Commission (UGC) Bangladesh; Prof. Dr. M.A. Hossain, member of UGC; Prof. Dr. N.C. Debnath, One Health coordinator, FAO; Dr. Ylva Persson, SVA, Sweden and Prof. Dr. G.B. Das, Vice Chancellor CVASU.

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Inaugural guests


Participants in the workshop


Participants in a group discussion


Concluding session


Members of field trip with farmers


Fun time at the Dean’s office

Bulk tank screening for mastitis bacteria with PCR test

Good milk quality is generally documented with low somatic cell count (SCC) and low total bacteria count (TBC). A high SCC value of >200,000 cells/ml in bulk milk is a sign that too many cows are infected with mastitis bacteria. TBC values of >10,000 bacteria/ml can be found in milk from herds with too many cows infected with mastitis bacteria, especially *Streptococcus agalactiae, Streptococcus uberis* and *Enterococcus* spp [1, 2].

To secure low SCC and TBC it is important to know which of the major mastitis bacteria are causing infections in the cows so that a proper prevention and treatment strategy can be set up for the herd. Monitoring of bulk tank milk (BTM) samples using the polymerase chain reaction (PCR) is a useful way of detecting mastitis bacteria in BTM, especially bacteria with a low prevalence (e.g. *Strep. agalactiae*)[1]. We have evaluated a new real-time PCR kit, Mastit 4, from the company DNA Diagnostic (Risskov, Denmark) for surveillance of BTM samples for mastitis bacteria.

The objective of this study was to compare the PathoProof Mastitis Complete 16 kit (Thermo Scientific) with the Mastit 4B kit for detection of four species of bacteria (*Staphylococccus aureus*, *Strep. agalactiae*, *Strep. uberis* and *Mycoplasma bovis*).

As part of the annual screening of all BTM samples in Denmark in October 2014, 328 samples were initially collected for the comparison study. All samples were transported on ice to the Eurofins laboratory (Vejen, Denmark) and analysed on the day of arrival. Analyses were carried out using two commercially available real-time PCR tests, PathoProof Complete 16 and Mastit 4B. The results of both tests (cycle threshold, Ct, values), were submitted to the Danish Knowledge Centre for Agriculture for statistical analysis for the four bacteria (*Staph. aureus*, *Strep. agalactiae*, *Strep. uberis*, and *M. bovis)*. For both tests, a cut-off value of Ct ≤37 was taken as positive. The results were analysed by common statistical methods, calculating Kappa values for test agreements and using McNemar's test for independence.

For *Strep. agalactiae* in BTM, the agreement between the two tests was moderate to high, for *Staph. aureus* agreement was moderate and for *Strep. uberis* agreement was moderate (Table 1). For *M. bovis* the agreement between the two tests was low [3].

PathoProof	Mastit 4B	
	Positive	Negative
Positive	158	18
Negative	82	70

Table 1 Comparison of test results for*Streptococcus uberis*

The number of samples that were positive in the Mastit 4 test but negative in PathoProof for *Staph. aureus, Strep. agalactiae, Strep. uberis* and *M. bovis* were, respectively, 34,7, 82 and 5 samples. For each of the four bacteria, about half of these samples were sent for gene sequencing, which confirmed that the initial positive Mastit 4 findings were correct.

The new real-time PCR test Mastit 4B from DNA Diagnostic has the same accuracy as another commercial PCR test. For *Strep. uberis,* the Mastit 4B test detects statistically significantly more positive bulk tank milk samples.

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News from Member Countries

Antibiotic stewardship in the United States dairy industry

The U.S. dairy industry approaches antibiotic stewardship through a series of interrelated regulatory and industry programs to assure judicious and responsible use of antibiotics on the farm, routine residue testing to assure a safe supply of milk and dairy beef, and resistance monitoring to maintain viability of antibiotics for animals and humans. The U.S. Food and Drug Administration (FDA) has oversight of antibiotic approval and use in dairy animals. As mandated by the Federal Food, Drug, and Cosmetic Act, a new animal drug may not be sold unless approved through a New Animal Drug Application [1].

The FDA also administers the *Pasteurized Milk Ordinance*, which includes antibiotic residue testing in milk and milk products [2]. All bulk milk transport trucks are required to be tested for antibiotic residues. Federal data indicates high level of compliance with milk withdrawal times for antibiotics. Antibiotic residues in trucks for bulk milk transport have declined by nearly 90% since 1996 to 0.012% in 2015 (Fig. 1). If any residue is found, the milk must be disposed of and will not enter the food chain. Farmers are held financially responsible for any milk on transport trucks that test positive for an antibiotic residue and a state may suspend their license to sell milk.

The U.S. Department of Agriculture (USDA) has oversight of dairy beef, including inspection and antibiotic residue testing at slaughter. In the USDA risk-based approach, animals are identified by Federal veterinary inspectors at the slaughter plant for residue testing. Federal data indicates high level of compliance with meat withdrawal times for antibiotics. In 2012, 0.016% of dairy cull cows had an antibiotic residue [3]. If any residue is found, the dairy beef must be disposed of and will not enter the food chain. Farmers who market a dairy cull cow with an antibiotic residue are subject to a Federal inspection about antibiotic use.

The U.S. dairy industry's programs for judicious and responsible use of antibiotics are administered through *The National Dairy FARM Program: Farmers Assuring Responsible Management* for both animal wellbeing and residue avoidance programs. A cornerstone of the animal wellbeing program is the establishment of a written herd health plan, which emphasizes prevention, rapid diagnosis, and quick decision-making on necessary treatment of all sick or injured dairy cattle on the farm [4].Both the animal care and residue avoidance program for milk and dairy beef require a veterinarian–client–patient relationship, whereby the dairy farmer must consult with a veterinarian to develop treatment protocols that address the proper use of antibiotics [5]. FARM program data shows that 84% of dairy farms have a veterinarian–client–patient relationship and 93.7% have a written or oral herd health plan[6].

A new U.S. national effort on antibiotic resistance, the *National Action Plan for Combating Antibiotic-Resistant Bacteria*, provides a roadmap for addressing antibiotic resistance from animal and human use [7].The *Presidential Advisory Council on Combating Antimicrobial Resistant Bacteria* has released the *Initial Assessments of the National Action Plan for Combating Antibiotic-Resistant Bacteria* [8]. The report contains a wide array of recommended goals and objectives to combat antimicrobial resistance. The goals and recommendations specific to antibiotic use in livestock include: (1) on-farm antibiotic use data collection; (2) increasing antimicrobial stewardship in food and companion animals (including additional veterinary oversight); (3) flow of antimicrobial resistance through the environment (from use in animals to people and use in people to animals); and(4) development of new disease detection, prevention, control, and treatment options (vaccines, new animal-only antibiotics, and more).

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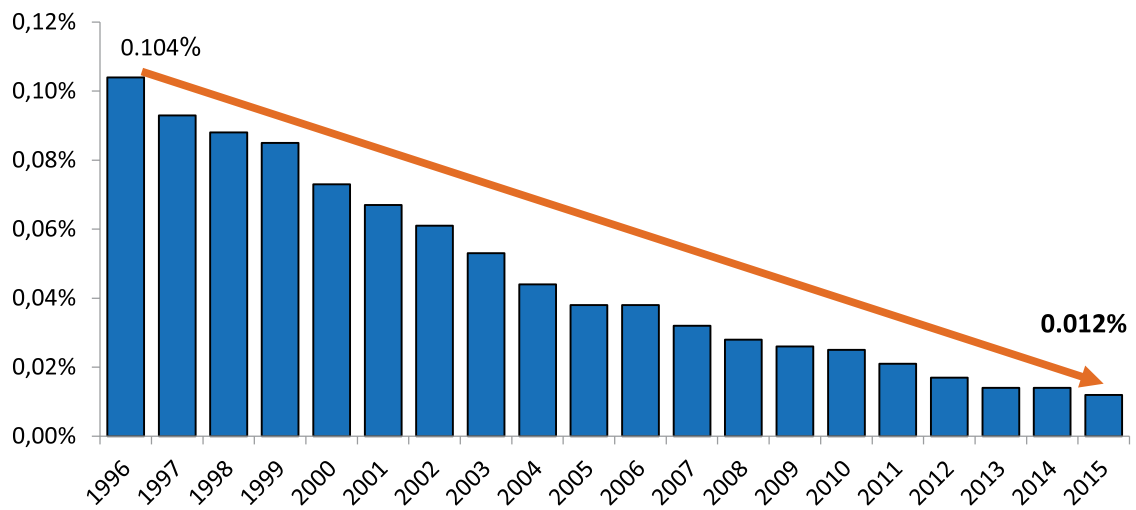

Figure 1 Percentage of bulk milk transport trucks tested positive for antibiotic residue

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Secure Milk Supply Plan for a foot-and-mouth disease outbreak in the United States

In the event that foot-and-mouth disease (FMD) is diagnosed in the United States, a national animal health emergency would be declared, with the livestock and allied industries feeling the immediate impacts of animal and product movement restrictions, animal quarantines, disease surveillance activities, and other necessary measures implemented to control the disease. Control measures, although necessary to contain the outbreak, will impact the normal business practices of uninfected producers in affected regions, potentially disrupting interstate commerce.

The U.S. dairy industry, utilizing 'just-in-time' supply models, relies upon daily animal, product, and other supportive movements and does not have capacity to store milk for more than 24–48 hours. Disruption of normal milk movement will affect the provision of milk and milk products, as well as create significant milk disposal, environmental, and animal welfare issues. The challenge to control and eliminate FMD, while maintaining the long-term viability of the U.S. dairy industry, is complex with multifaceted challenges. The U.S. Department of Agriculture (USDA) is collaborating on a *Secure Milk Supply (SMS) Plan* through academia-facilitated emergency management planning efforts with state regulatory officials and the dairy sector [1].

The SMS Plan's initial goal is to develop agreed upon processes and procedures to collect, transport, and pasteurize milk from farms in FMD control areas, thus helping to maintain business continuity for dairy producers, haulers, and processors. These guidelines are detailed in the *SMS Biosecurity Standards for Raw Milk Collection and Transport*[2]. The biosecurity performance standards (BPS) are guidelines intended for:

- Decision makers at a state or regional level, to develop specific options to mitigate FMD virus spread by milk trucks/tankers and haulers/drivers within an FMD Control Area based on response goals, industry capabilities, environmental considerations, and size and duration of the outbreak.
- Dairy premises owners, to develop their own farm-specific standard operating procedures (SOPs) that meet or exceed the BPS with the goal of preventing exposure of their cattle to FMD virus through raw milk collection and movement activities.
- Milk haulers/drivers, to take necessary precautions to ensure FMD virus is not spread by their truck/tanker, equipment, hands, clothing, or footwear during milk movement.
- Dairy processing plant personnel, to ensure FMD virus in raw milk is not spread to susceptible species by vehicle movement, on clothing or footwear.

A key component of the SMS Plan at the dairy farm is the identification of a line of separation (Fig. 1) to separate off-farm traffic from on-farm movementsof vehicles, people, and animals to only allow access through controlled access points. The first goal of the line of separation is tolimit direct (animal contact) and indirect (contaminated vehicles, footwear, equipment, run off) exposure of FMDvirus to susceptible animals on the dairy farm. The second goal is to prevent movement of FMD virus from a dairy farm that is infected but undetected. Crossing the line of separation through a controlled access point requires thatspecific biosecurity practices are followed for all vehicles, personnel, and equipment.

The USA has a large and diverse dairy industry producing 95 billion kilograms of milk annually from 43,584 licensed dairy farms in all 50 states [3]. Thus, the success of the SMS Plan rests on the ability to customize the national plan to state and regional specific conditions. State and regional planning efforts (Fig. 2), representing 66% of total U.S. milk production, are underway [4]. Each state and regional plan is consistent with the national SMS Plan, gathering local information on infrastructure, gaps, training needs, and the industry's ability to meet biosecurity requirements.

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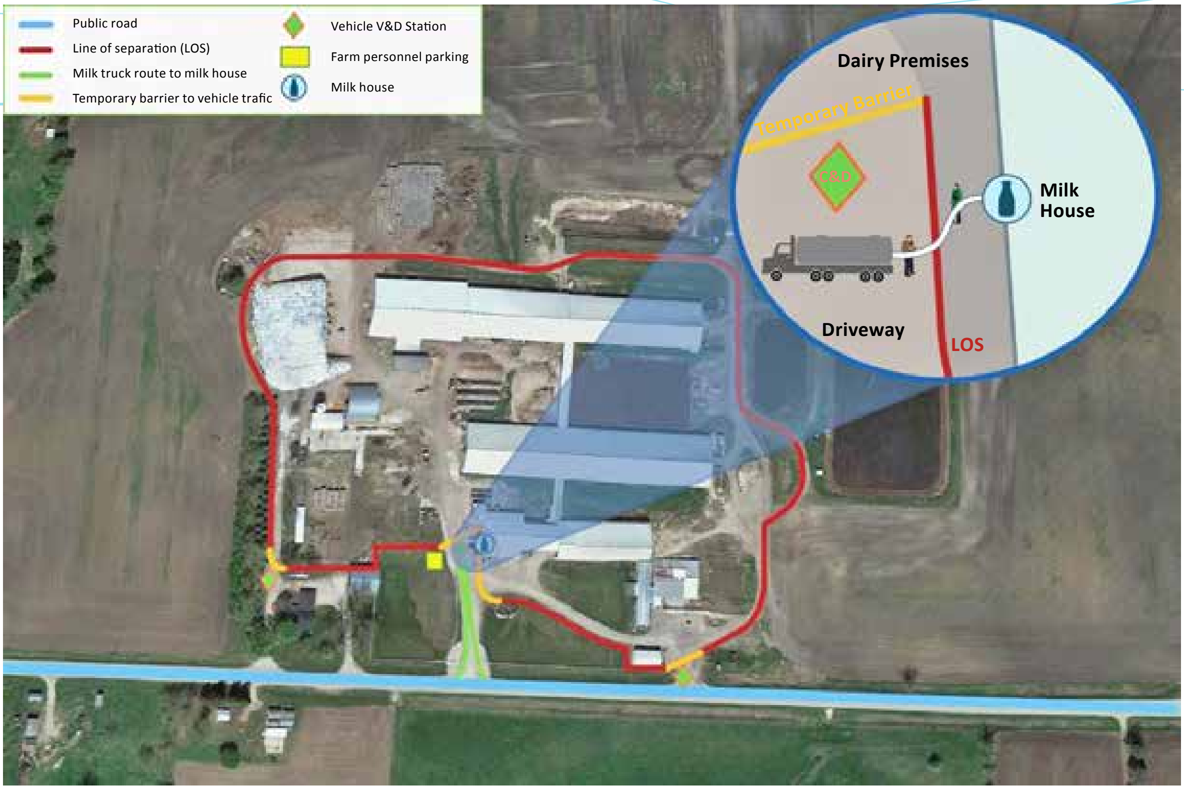

Figure 1 Example of a Secure Milk Supply Plan line of separation

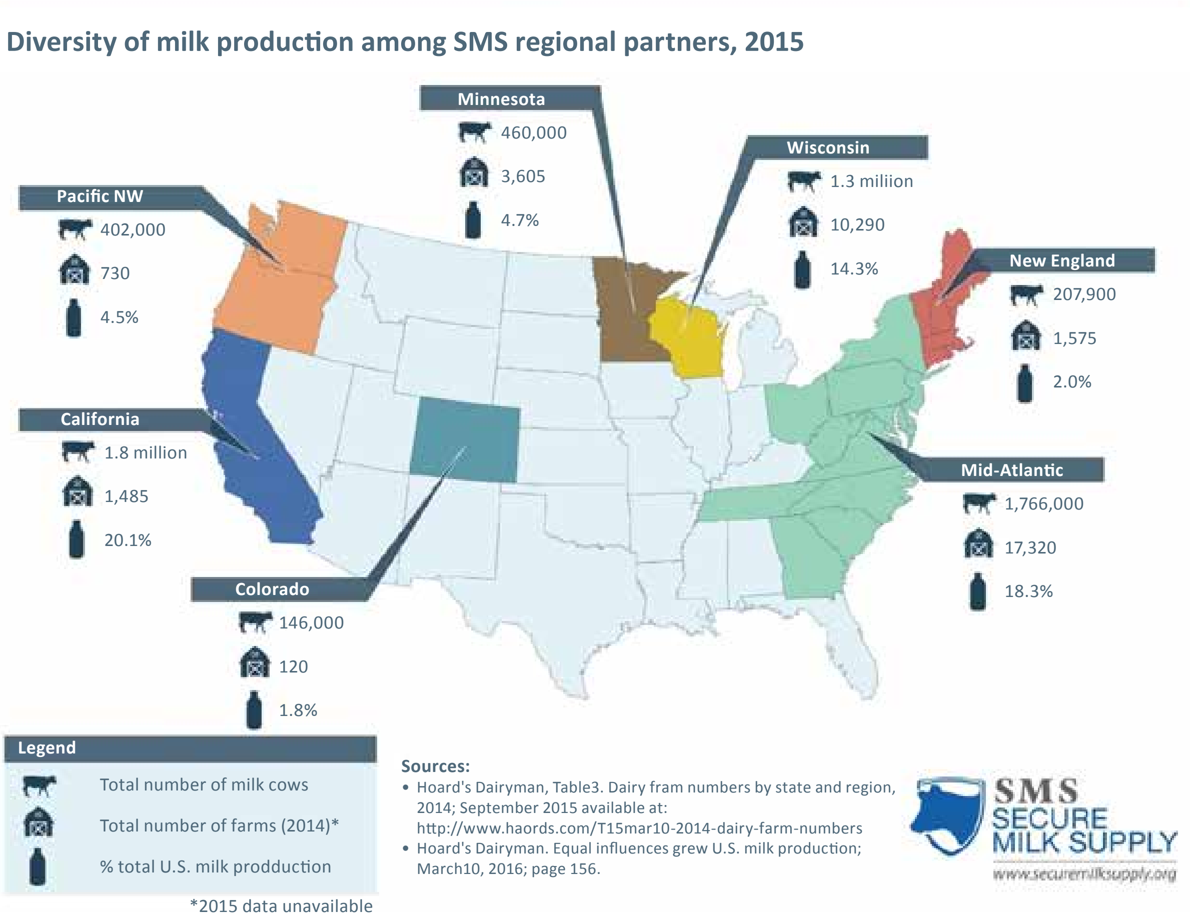

Figure 2 State and regional Secure Milk

Cell count pyramid for a herd with automatic milking

Background

Some Swedish farms have experienced a tendency for higher somatic cell counts (SCC) during the last decade. This causes an uncomfortable loss in both milk and money. Studies have estimated the production loss to be 0.9 Euros per 1000 increase in SCC per cow-year [1, 2]. Swedish farmers, besides the quality payment, therefore lose approximately 25 million Euros as a result of subclinical mastitis. A problem is that farmers, advisors and veterinarians seem to accept that new barns, with or without robot milking, have higher SCC.A multivariate regression analysis of the association between herd level SCC and herd factors have been performed repeatedly at Växa Sverige [3]. There is significant correlation (p<0.001) for some herd factors with elevated herd level SCC in some herds (see Table 1).

Herd factor	SCC effect
AMS vs. conventional milking	**+ 38 000**
100-200 cows vs. < 50 cows	**+ 36 000**
Holstein vs. Swedish Red	**+ 16 000**
Organic vs. Non organic	**+/- 0**

Table 1 Effect of different herd factors on SCC for Swedish milk recorded cows in 2015

The educational benefit of the pyramid is that it ranks risk areas that need to be secured. To reach lower SCC and better udder health you must start by thoroughly tackling the basics. Higher level actions will have less or no positive effect if the basic activities are inadequately performed.

A stable pyramid needs a solid foundation.

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The Cell Count Emergency adds a new pyramid

Since 2012 all Swedish farmers, advisors and veterinarians have free access to an interactive website (*Cell Count Emergency*). Adding herd data and bacterial spectrum gives them a cost calculation and a suggestion on what to prioritize to reach lower cell count and better udder health. Studies have shown that there are many new risk factors in automatic milking systems regarding SCC and udder health[4]. Therefore, a totally different cell count pyramid has been programmed and added to the *Cell Count Emergency*website in 2016, (see Fig 1). The other material is a concrete guide to more consistent and adequate management routines for less mastitis and lower SCC in farms using an automatic milking system (AMS).

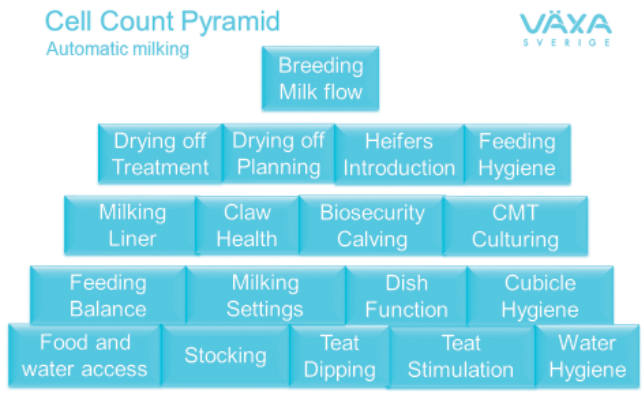

Figure 1 Cell Count Pyramid for robot milking (from the *Cell Count Emergency*)

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UK takes action on Johne's disease

Industry-led group Action Johne's launched a national Johne's disease (JD) management plan in April 2015 with an aim of engaging 80% of British dairy farmers in credible and robust Johne's management by October 2016.

This voluntary scheme is being rolled out to farmers through their milk purchasers and has gained considerable momentum over the last year.

The National Johne's Management Plan (NJMP) seeks to engage farmers in JD management, rather than just testing through assessment of herd status and herd risk, with an approach that recognises that a 'one size fits all' scheme will not work in our diverse industry.Farmers are encouraged to work with their vets (who are being asked to complete a bespoke online training course on the NJMP) to understand their herd JD status and also the risk of the disease entering their herd and then spreading within the herd. Using this information, the farmer and vet can then determine which of the six management strategies endorsed by the NJMP is the most appropriate for that farm.

The six strategies are:

1. Biosecurity, protect and monitor

For herds that have completed appropriate screening tests and have no evidence of disease, a robust biosecurity and surveillance protocol must be established to protect the herd from disease entry, including regular vet monitoring.

2. Improved farm management

For herds with low risk and low prevalence, who are able to commit labour resources to managing JD, work with your vet to manage ALL cows as if they are infected and a risk. Control the disease by breaking the cycle of transmission from cow to calf through management changes implemented across EVERY cow in the herd. This strategy must be combined with robust surveillance and reviews of risk.

3. Improved farm management and strategic testing

For herds with a higher prevalence, work with your vet to identify infected cows earlier for management through strategic testing. Implement management changes to break the cycle of transmission for these cows. As always, work with your vet to employ biosecurity and biocontainment measures.

4. Improved farm management, test and cull

This is suitable for low prevalence herds wanting to quickly remove infected animals from the herd BEFORE they get chance to spread JD. Work with your vet to adopt a culling policy in addition to the steps above.

5. Breed to terminal sire

This strategy may be suitable for herds with a high risk and high prevalence with no wish to breed their own replacements or the ability/resources to manage the risks through improved farm management. No replacement animals are bred, all cows are served to a terminal beef sire and all offspring are fattened for slaughter. Replacements are sourced from herds with lower levels of JD. It must also be remembered that on a farm with very high levels of JD, transmission between adult animals is possible. It may still be prudent to undertake testing to help identify cows for removal. ALL calves produced in this system MUST be slaughtered for beef and NOT enter the sucker herd as breeding animals.

6. Firebreak vaccination

Vaccination may be a short term option for high risk, high prevalence herds as a firebreak to 'buy some time' until another strategy can be adopted. However, once a herd is vaccinated it becomes very difficult to determine whether an animal is infected as the tests cannot differentiate between antibodies from vaccination and infection, which complicates disease management. Vaccination must be undertaken under the advice and supervision of your vet. It should be noted that the JD vaccination can interfere with the reading of the TB test and therefore some milk processors do not collect milk from JD-vaccinated herds.

Many farmers are already fully committed to managing JD on their farms and many more are now engaging through the NJMP.With vet and farmer training to ensure consistent information about JD control, we are in a much better position to push forward and tackle this disease.

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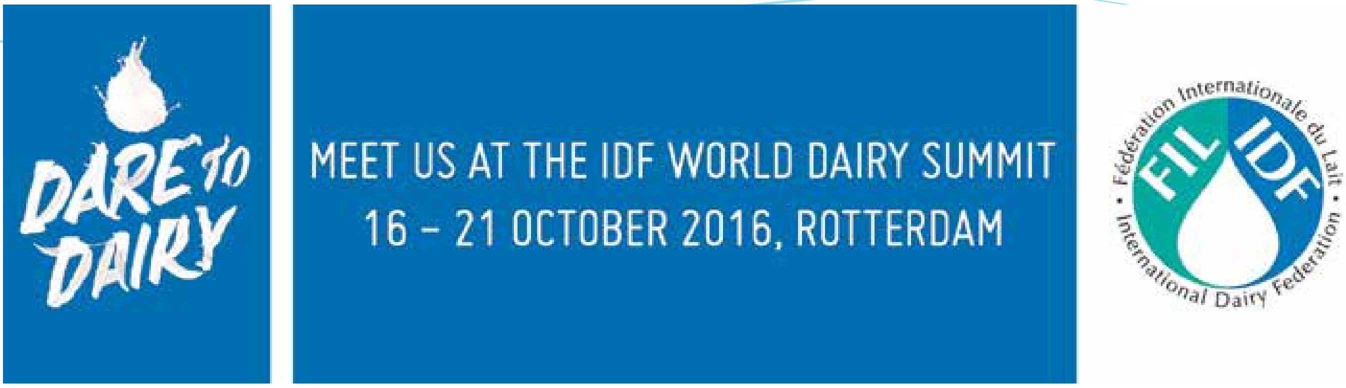
Future Meetings



The IDF World Dairy Summit is the annual top meeting of the global dairy sector, attracting about 1500 participants every year from all over the world. The IDF World Dairy Summit will take place on 16–19 October 2016in the Netherlands. The programme topics address farming and farmer's technology, economics, livelihood in the sector, nutrition, sustainability and food safety.

The dairy sector will be represented by high-level keynote speakers, for example, Roelof Joosten, CEO from Friesland Campina. Leading representatives of non-governmental organizations outside the dairy sector are also joining the 'Dare to Dairy', including Robin Ganzert (CEO America Humane Association), Jason Clay (World Wildlife Fund, USA) and Hans Mommaas (CEO Netherlands Environmental Assessment Agency). These experts will share their views on how dairy can sustainably contribute to the feeding of nine billion people and they will discuss the current situation of the dairy sector, addressing controversial topics.Donatello Piras, a professional moderator, is facilitating the debate.

Join us and participate using the mobile phone application we have prepared for you!

Some of the topics being discussed are:

How can we nourish a growing population in a sustainable way? This is the major challenge for the global dairy sector. Despite the disputed role of dairy in nutrition and sustainability, dairy remains an important source of safe, sustainable and nutritious food for the future.

Are cows treated well enough? Come and listen to the latest farm management, animal health and welfare monitoring within QA system. We present the latest developments in management technologies for sustainable dairy farming.

How can animal nutrition still be improved? Widen your views on cow nutrition and the role of nutri-genomics in future dairy farming.

We have organized fascinating technical tours through The Netherlands, so come and get a taste of the Dutch dairy! You can gain insights into our innovative farming and visit our processing plants with state-of-the-art technology. You can discover our cattle breeds and our specialized dairy farms. Or, you can learn about our high-class research and education and take a tour of our technology centres.To avoid missing the summit sessions, we have organised the visits for after the conference programme, on Thursday 20th and Friday 21stOctober.

For decades, Dutch dairy has been in the forefront of developments in the global dairy sector. The entrepreneurship, innovation and international orientation that underpin the competitive position of dairy in the Netherlands will undoubtedly attract many visitors from all over the world to the IDF World Dairy Summit 2016.

Rotterdam awaits you on 16–19 October 2016 for the IDF WD Summit!

Let us know if you want to contribute to the next issue of this Newsletter by contacting us at ylva.persson@sva.se or mtucci@fil-idf.org