

Organic dairy farmers' decision making in the first 2 years after conversion in relation to mastitis treatments

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Abstract

In organic dairy farming, a goal about improved animal welfare and avoidance of the use of chemicals has introduced restrictions in the use of antimicrobials for treatment of infectious diseases. Mastitis is the major cause of antimicrobial treatments in Danish dairy farming. In order to improve and minimise the use of antimicrobials and the risk of antimicrobial resistance in organic farming, a study based on qualitative research interviews with newly converted organic farmers was carried out. Twenty farmers, 18–26 months after conversion, were interviewed focusing on mastitis treatment patterns and the farmers' own perception of possible changes in strategies, choices and daily routines linked to mastitis handling. Antimicrobial treatment was the dominant treatment method in these herds, and regarded as the treatment method with best and most well known prognosis concerning a prognosis of cure. Severe symptoms of mastitis and affected general condition of the cow would cause antimicrobial treatment in all herds. Almost all other mastitis treatment choices were based on herd level considerations. Changes due to conversion to organic farming were experienced on the level of land and crop production, and only to a very little extent directly linked to the herd and management choices related to disease prevention and treatment. Veterinary involvement in choices and professional discussions seemed very sparse, and a major challenge for the future development of organic dairy farming must be outlined, in relation to development of explicit treatment strategies based on well-evaluated data analyses, founded on the results from the individual herd.

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1. Introduction

Organic farming is guided by a set of fundamental goals and ideas. Overall, farm level recycling of nutrients, a close contact between the farming society and consumers (Alrøe and Kristensen, 2002), and

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harmony between levels on the farm (e.g., number of animals per hectare) can be mentioned. For the herd, it is more difficult to define and express ideas, which are specifically organic. The understanding of animal welfare can be related to some overall goals for organic farming (Verhoog, 2000; Lund, 2000). From August 2000, the Danish legislation in relation to organic farming has been based on EU regulations (Anonymous, 2000). These regulations reflect the explicit striving towards greater health promotion and disease prevention, for instance by imposing restrictions on the use of anti-microbial treatments. Anti-microbial treatment automatically involves the use of chemicals, which is generally not wanted in organic herds.

During the past decade, an increased public health concern for development of anti-microbial resistance has influenced the debate about disease treatment. Simultaneously, veterinarians have raised concern about the attitude towards anti-microbial treatment in organic farming. They fear that an explicit avoidance of anti-microbial treatment can lead to a non-treatment policy. This may result in diseased animals not being treated appropriately in cases where anti-microbial treatments are defined as the most suitable treatment method. This raised animal welfare concerns among Danish veterinarians (Anonymous, 1998).

In the organic dairy herd, mastitis is definitely the dominant disease problem, and in several studies, mastitis levels have been found to be similar or higher compared to those found in conventional production (Augstburger et al., 1988; Hovi and Roderick, 1999; Krutzinna et al., 1996; Offerhaus et al., 1993; Spranger, 1998; Weller and Cooper, 1996;). Risk factors connected to the environment, the organic rules and the structure of organic milking herds can be mentioned—and in each case, several of these factors will most likely be involved, since the causal background for mastitis and udder health problems is complex.

Conversion to organic farming may involve a number of changes at farm level, such as building new housing systems, changes in feeding and feeding strategies, altering the herd size, and other modifications of a more structural character. These changes, in addition to a gradual change in the farmers' attitude may influence the future anti-micro-

bial treatment patterns on a herd level. How much time such changes will take is unexplored and not described properly. It may take several years before 'conversion' has been completed. Previous qualitative analyses of farmers' choice of disease treatments in conventional herds showed that treatment decisions are complex and involve several levels of decisions from symptoms, single animal characteristics and the situation of the herd (Vaarst et al., 2002). Therefore, it can be expected that choices of disease treatment in organic herds will be influenced by the organic goals and standards, where the use of chemicals is restricted and the effort on animal welfare and health promotion is underlined.

In order to examine how anti-microbial treatment patterns could be influenced during the conversion process from conventional to organic farming, a study was carried out in 20 herds from the point of conversion and up until 20–24 months after conversion. In this paper choices related to mastitis treatments will be described, mainly as they are seen from the farmers' perspective as expressed in qualitative research interviews. The focus is on aspects of farmers' experience after 2 years of conversion. The farmers' perception of herd management changes during the period of conversion is included in the analysis, and discussed in relation to the possible influences of these changes on treatment decisions, treatment patterns and disease management in the herds. Based on this, future possible guideline for sustainable use of anti-microbial therapy in organic livestock production will be discussed.

2. Material and methods

2.1. Selection of herds

Twenty farmers who all started converting the milk production at their farms during the period of June 1999 to June 2000, were included in the study. The selection was based on participation in a larger study, the so-called Kongeå-project (Andersen et al., 2000). The farmers were geographically distributed in the southern and western part of Denmark, and related to different veterinary practices and different advisory centres. No common training had taken place in relation to their conversion. Herd charac-

teristics related to mastitis treatment and milk production in the herds are presented in Table 1.

2.2. Data collection and analysis

Semi-structured qualitative research interviews were carried out in 20 organic herds 18–26 months after conversion. The interviews were based on the five most recently treated mastitis cases and the five most recently culled cows. No specific questions were related to this, but the interview took place while referring to the withdrawal notes and lists of cows that had been culled from the herd. A number of thematic questions were asked (presented in Table 2), and the farmers were asked to respond to a figure showing mastitis treatment decisions, developed from an earlier study (Vaarst et al., 2002). The interviews lasted from 58 to 92 min.

All interviews were carried out at the private homes of the farmers, after a walk in the stables, where physical changes in the structure of the herd and housing system were discussed.

The interviews were transcribed in their full length with exception of parts, where specific treatments and cullings were discussed. These parts were merely summarised. Some sequences of the interviews, which were not directly linked to the dialogue about mastitis treatments were excluded or briefly summarised in the transcripts.

The interviews were analysed across interview persons using an approach adapted from the 'Grounded Theory Analysis' method (Strauss and Corbin, 1990, 1996). Initially, open coding was made through creation of meaning condensates. This means that sequences of one statement or exchange of ideas were given a heading, which summarises the

Table 1
Herd characteristics of the 20 herds converting to organic farming in 1999 or 2000

Herd no./ conv. year	No. of cows per year		Herd somatic cell count (estimated from monthly milk control data)			Average milk yield, kg per day of 4% FCM from cows in first lactation with SCC < 200 000			Vet. mastitis treatments, % lact. per month		
	- 1	+ 2	- 1	+ 1	+ 2	- 1	+ 1	+ 2	- 1	+ 1	+ 2
1/99	92	87	222	298	234	26.2	24.8	24.4	2.6	1.2	2.2
2/99	73	144	313	319	295	21.7	22.1	22.1	3.3	2.7	1.8
3/99	89	87	283	382	393	23.3	23.9	25.0	7.9	2.4	4.1
4/99	72	71	268	241	283	19.6	20.5	23.9	0 ^b	0 ^b	0.7
5/99	50	54	172	195	147	24.8	23.8	25.3	0	0	0
6/00	104	109	339	319	317	20.8	21.3	21.2	3.4	1.9	2.3
7/99	77	81	376	298	325	22.8	19.2	21.7	1.3	2.2	0
8/99	45	62	324	313	362	20.9	20.0	20.3	4.4	3.4	3.2
9/99	118	114	317	324	377	21.4	19.8	19.8	4.3	3.2	4.2
10/99	48	55	410	483	444	21.7	20.6	19.8	5.0	9.8	7.6
11/00	51	81	233	226	247	21.9	19.7	20.1	8.9	2.4	3.0
12/99	107	118	319	379	342	21.3	18.8	20.3	4.9	4.1	6.9
13/99	66	108	363	423	417	19.0	17.4	19.1	2.3	1.1	0.9
14/00 ^a	83	87	202	242	234	21.6	21.2	22.8	4.4	3.5	4.6
15/00	90	118	172	224	258	24.1	24.3	23.4	4.3	3.9	2.8
16/00	119	135	397	434	300	21.3	21.0	18.0	6.0	4.5	3.6
17/00	178	276	275	286	284	20.8	21.5	23.6	2.6	3.2	4.6
18/00	79	90	387	384	338	22.4	23.0	20.8	3.6	3.3	1.6
19/99	107	119	275	307	291	24.7	23.1	24.9	0	2.4	4.0
20/99	81	107	359	350	407	23.4	20.7	19.6	5.6	8.5	9.4
Average 1999	82	96	317	324	342	22.4	21.1	21.4	3.2	2.7	3.0
Average 2000	87	100	275	392	293	21.1	21.4	22	3.6	3.2	2.7

^a Year - 1 = the year before conversion; year + 1 = the first year after conversion of the dairy herd; year + 2 = the second year after conversion of the dairy herd.

^b Recording bias with regard to disease treatments in this herd.

Table 2

The interview guide, including all three themes of the interview: the actual treatments and cullings, the discussion about treatment criteria based on the figure, and a number of thematic questions based on the farmers' perception of conversion, being organic and changes connected to this

Interview guide; farmers in conversion—2 years after conversion:

- (1) The last five mastitis treatment cases and the last five culling cases + the last five treatments of calves (if any).
 - (2) Which cows are treated and not treated (brief discussion based on list of single cow somatic cell counts)?
 - (3) Discuss the diagram (enclosed; see Vaarst et al., 2002).
 - (4) What is your own experience of conversion, the changes during the time of conversion and the context of changes?
 - (5) How do you collaborate with your veterinarian and others—as you experience it?
 - (6) How have this changed during the first 2 years of conversion?
 - (7) Which expectations do you have to your future development as organic farmer?
 - (8) What have you learned, being an organic farmer, which you would like to share with colleagues?
-

content of this statement. After this, axial coding was applied, where themes across interviews were identified. A model based on themes central to the choices of treatment was formed and is presented and discussed in the following.

3. Results

3.1. *The perception of disease problems*

Mastitis was mentioned as the dominant disease problem most commonly treated with antibiotics in all herds. In two herds, digital dermatitis was mentioned as the most severe disease problem, but no treatments were used for this disease.

3.2. *The perception of 'antibiotic treatment' as the most responsible mastitis treatment*

By most of the interviewed farmers (18), antibiotic treatments were perceived as the treatment method giving the best prognosis with regard to 'cure', mostly defined as eliminating the bacteria. Therefore, antibiotic treatment was regarded as the 'most responsible' treatment method in relation to animal welfare, where animal sufferings should be terminated immediately. By few (four to five) of the interviewed farmers, the question was opened, whether antibiotic treatment could be replaced by other treatments, which were as 'responsible' (mean-

ing: giving the best prognosis out of all possibilities) as antibiotic treatment in clinical acute mastitis cases. This meant that antibiotic treatments typically would be related to treatment of cows, which the farmer would stake on, or in treatment situations where the cow was ill and something 'radical' should be done for animal welfare reasons. The potential danger of developing antimicrobial resistance was only to a very little extent included in any considerations of the farmers.

3.3. *The perception of treatment choices related to 'ill cows'*

Treatment choices related to acute mastitis cases were primarily linked to animal welfare perspectives. All farmers exclusively chose antibiotic treatments for 'ill cows', i.e., cows with clinical signs of disease. Their criteria for considering a cow to be 'ill' were generally linked to fever, affected general appearance and having a hard, swollen, red udder quarter. The rapidity of development of signs of mastitis was also included in the considerations. The treatment of acute clinical mastitis was normally decided immediately, based on symptoms, and not based on whether the cow had characteristics which were regarded as valuable for the herd. Cows with chronic recurrent mastitis would also be treated with antibiotics, if they suddenly developed severe and acute signs of mastitis, even though the farmer had decided to give up on that specific cow.

The care taking efforts related to the individual cows—such as spending time on stripping out between milking because of mastitis—were partly based on animal welfare considerations, if performed. However, the effort was also related to how time demanding it would be (the efforts towards an individual cow would demand much of the total time of a farmer's daily management routines). Change in housing system and a different crop production forced the farmer to make priorities with regard to choices of care taking routines: the choices had to be balanced with general herd priorities.

3.4. The treatment choices related to cows with mild symptoms

When the symptoms were not alarming and acute, treatment choices were primarily based on the characteristics of the cow, to a high degree evaluated as “the value of this cow for fulfilment of goals for this specific herd”. Consequently, most of the treatment choices in cases of mild mastitis or high somatic cell counts were based on herd perspectives, which will be elaborated further below.

On few farms, some cows had a special status in the mind of the farmer and were ‘favourite cows’ based on arguments, which were not linked to the development of the herd, e.g., that they were born on a special day or they looked in a special way. These cows had a kind of ‘value of their own’, which meant that they would be treated, also in cases where they only showed minor symptoms, or in cases of chronic recurrent mastitis, which had shown to have a ‘bad prognosis’ already.

3.5. Treatment choices based on herd perspectives

All other choices than the acute cases of ill animals and some treatments of ‘favourite cows’ as mentioned above, were made in order to maintain the herd structure and support the strategy of the farmer, which is summarised in Table 3.

Consequently, where animal welfare considerations played a central role when treating cows with acute, severe mastitis, the farmers faced major challenges in order to integrate treatment choices with the goals, ideas and strategies of the entire herd. Examples of this could be to let the somatic cell

count of the bulk tank milk be decisive for treatments, choosing anti-microbial treatments instead of culling cows with chronic mastitis in herds under expansion, or lack of milk to fill up the milk quota. These decisions were made almost solely by the farmer and based on a regular evaluation of key figures. In none of these herds, review or analytical use of data from the herd supported more long-term strategies, nor were they used to evaluate whether the goals were met by the strategies of the farmer.

In Fig. 1, the interview results are illustrated: the organic goals are directed both towards non-chemical treatment and prevention of mastitis. Organic goals also emphasise animal welfare, which includes avoidance of suffering. In relation to mastitis, avoidance of suffering means appropriate treatment.

3.6. The partnership between farmer and veterinarian involved in choice of treatments

Only one of the farmers felt that the relation and collaboration with the local veterinarian had improved since conversion. The others perceived no change or little change to the relationship. They expressed that the veterinarian's attitude was influenced by a more or less profound, general scepticism towards the ideas of organic animal husbandry and towards working with specific rules. The veterinarians very often did not perceive a difference between conventional and organic herds.

In few cases, the farmer and the veterinarian had a health advisory contract at conversion, which was denounced after conversion because the farmer could not possess antibiotics for post-treatment as an organic farmer.¹

In one herd, the farmer still had an agreement with the veterinarian to have monthly health advisory visits, but they spent the visits dehorning calves and talking, as expressed by one of the farmers: “Now

¹In Denmark, a health advisory contract can be signed between a farmer and the veterinarian of the herd, allowing the farmer to have antibiotics for post treatment given that the veterinarian will come for monthly advisory consultancy visits in the herd. This is not allowed for organic farmers, who cannot have antibiotics handed out (except for calves <0.5 year of age if fulfilling certain demands). In organic herds, it is legal to have a health advisory service agreement, but it does not involve agreements on medicine.

Table 3

Different possibilities and areas of choices, where the stockperson can regulate the herd and the treatment pattern in order to fulfil strategies and goals for the herd in its daily life as well as more long-term goals

Possibilities for the farmer to act	Examples of choices that would support the herd strategy
Keeping list (Cows that the farmers would want to keep)	Cows with certain characteristics that either fitted with goals of the herd (milk yield, good temperament), or were related to avoidance of certain herd problems (e.g., strong legs or robust udder). In some cases, the farmer (or others at the farm) had special personal preferences for a specific cow.
Culling list	Ideally, cows were chosen to be on the culling list at an early stage. These cows would then not be inseminated, and be culled when new heifers could be included. The culling list was often based on the herd situation and problems in the herd. E.g. problems with somatic cell counts would lead to choices of cows for culling with udder health problems. When herd size was increased, the farmer could hardly afford to cull any cows, which had a significant impact on the treatment pattern (e.g., treatment of more chronic cases).
Bulk milk somatic cell counts	High somatic cell count of bulk milk (in some cases interpreted from single cow somatic cell counts) would on most farms lower the treatment criteria significantly.
Practical conditions	Number of milkfed calves in the herd partly decided which cows should be treated or milked to calves because of high somatic cell count. The current amount of work on the farm partly decided the amount of effort that could be placed on mastitis cases.
Perception of alternatives to antibiotic treatment	The farmer's perception of which choice he/she regards as relevant is highly influenced by the individual characteristics of the cow with mastitis. This included e.g., time and willingness to perform care-taking efforts (extra milking out), belief in alternative treatment methods and perception of ('pride' related to) blinding one teat and making cows three teated.

we have a routine where he gives the calves local anaesthetics for dehorning. Then we talk a bit and he writes a report—but it is so sparse, so sparse, so sparse—he really has nothing to write. He does not have anything to offer us—I guess not much happens in the veterinary world—I guess it is the same kind of penicillin they have used for the past 25 years”.

The farmers generally experienced that the veterinarian had not contributed with perspectives, suggestions or dialogue, which inspired or challenged them in relation to being an organic farmer. As illustrated in Fig. 1, farmers generally involved their veterinarians in antimicrobial treatments.

One farmer had experienced a close dialogue with his veterinarian during periods with difficulties, and his veterinarian had encouraged him very much to be critical towards antibiotic treatments and to have a positive attitude to homeopathic treatments. His

veterinarian would like to have a closer collaboration, but the farmer felt that his own financial situation did not allow for high expenses on veterinary services, as long as he did not have major problems, which could be solved by veterinary advice or assistance. All other farmers felt there was very little interest from their veterinarian in their situation as organic farmers. All farmers expressed that the action of the veterinarian was linked to individual treatment cases, and very rarely did it include any herd level perspectives (Fig. 1).

3.7. Alternatives to antibiotic treatment

(1) The farmers discussed a number of alternatives to antibiotic treatments: drying off one quarter was an alternative method, which was generally used by many of the farmers in cases of chronic mastitis in

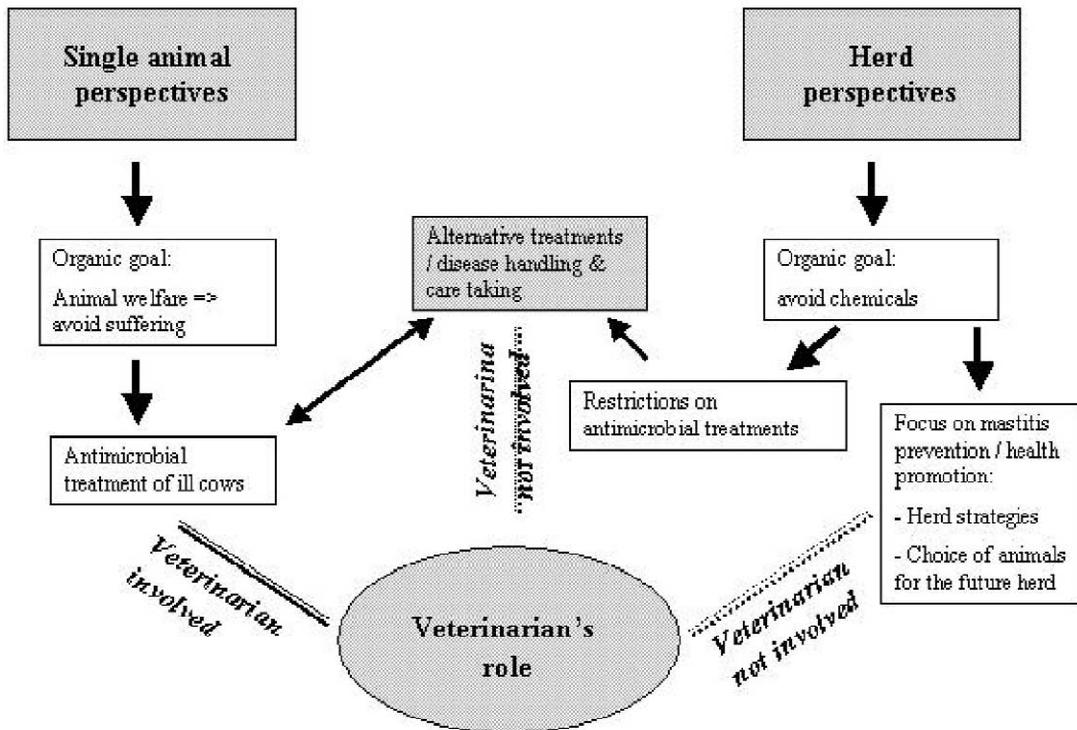


Fig. 1. Mastitis treatment choices and the goals of the organic dairy herd, focusing on choices related to single animals and the herd, and the role and major focus for involvement of the veterinarian, as perceived by the converted organic farmers.

one quarter. In most cases, blinding one quarter was done by ceasing to milk one quarter (the cow would often show a decrease in milk yield in that particular quarter, which made it easier). Few farmers described problems related to the process of blinding one teat, because of continued milk flow and/or the need for stripping out very low quality milk by hand at milking during a period of few weeks, which meant increased risk of infecting other cows.

(2) Very few farmers used homeopathy. The farmers introducing this treatment method would prefer to use few remedies or one or few combined remedies, which claimed to be helpful in cases of elevated somatic cell counts. In most cases, they considered it difficult to diagnose and apply in loose housing systems and in large herds with little knowledge about single cows. The complete lack of experience and of sparring partners (veterinarians or

competent farmers) in the learning process was also mentioned as a reason for not paying attention to the possibility of using homeopathy. Some farmers expressed lack of interest or scepticism towards homeopathy based on the lack of scientific evidence for the effect of the treatment method.

(3) Use of ointments like peppermint oil was applied by many, both as treatment method in mild or chronic cases (flakes in the milk and in some herds slightly swollen udder quarters). It was easy to apply during milking—in some herds combined with udder massage and stripping out by hand in the milking parlour—and seemed to work well, which meant that it removed the symptoms and kept the cow from developing more systemic symptoms.

(4) Stripping out by hand between the two daily milkings was done only in very few herds. In one herd, a Dutch herd manager was very much focused

on care taking of single animals, which the farmer appreciated very much, but linked to his personal skills rather than to farm strategies. It was considered time consuming, and the housing systems were rarely built in a way which made separation easy. Most farmers did not believe it had an effect that could justify the time spent on this activity.

(5) Replacement strategies focusing on mastitis problems were considered an important part of the effort to generally improve udder health in the herd. More farmers expressed hopes for a genetic improvement of cows, and an active choice of cows to the herd focusing on ‘robustness’ and good udder qualities, as expressed by farmer 2, talking about choosing cows to keep in the herd, and sires for insemination: “. . . I do not pay much attention to the high milk yield. I give high priority to the good qualities, udder and legs . . . [. . .] . . . it is more and more that we develop some cows who can manage things on their own—and then we will take care that they also yield some milk through good feeding . . . [. . .] . . . I work on creating a robustness in the whole system in general, with robust cows . . .”.

(6) Doing nothing was generally the way of handling chronic or recurrent cases (e.g., some cows, which had flakes in the milk in relation to being in heat). In most cases, the milk was milked separately to the calves from these cows.

3.8. Changes related to the conversion

The changes related to conversion were primarily linked to the land, the crops and the farming system. Building a new housing system was often a direct consequence of the conversion, but not perceived as something ‘specifically organic’. Few routines were changed, and those which were—e.g., drying off strategies—were motivated by changes in herd size, housing system or advice offered by colleagues or advisors, and not perceived as “something that was done in connection to being organic”.

The number of days per anti-microbial treatment had decreased in most herds from 2–3 to 1–1.5 days, and in several cases of mastitis, the cow was only treated once by the veterinarian. A decrease in number of days per treatment was experienced. This was linked to the absence of the previous mentioned

official health advisory contract, where the farmer had drugs for post-treatment. In one herd, the veterinarian often used another drug with a shorter withdrawal time on the second day of treatment. In general, treatment was always decided by the farmer on the same day, the treatment should be made, also if it was second treatment of a given mastitis case. This decision was based on the farmer’s observations of the cows and the severity of the signs of mastitis. It was, in other words, not expressed as a decision made in a collaboration effort between the farmer and the veterinarian, who made a professional judgement of the case.

3.9. Choice of treatment in relation to being an ‘organic farmer’

Any change in the choice of treatment in relation to mastitis was only to a very little extent linked to the process of conversion. Most farmers expressed that they may have altered their criteria for antibiotic treatments or culling or both, but they related it to the general economical development in farming of today rather than to being organic. All changes—related to conversion to organic farming or not—were generally found on herd level, and not in the criteria for treating individual cows based on symptoms.

Several of the farmers described a situation of a fundamental choice with regard to the future of the farm, when they had decided to convert to organic farming. They had a feeling that converting to organic farming could promise them a future as milk producers. Conversion often led to building of a new housing system, which was always loose housing systems, and in connection to this, very often an increase in herd size. Harmony between area of land and number of cows, production of roughage and home grown feed in general, and extended summer grazing provided many of the farmers with challenges and a feeling of working with a robust and whole system. All these changes and adaptations of the farming system gave the farmers a feeling of “building up a herd for the future”.

Most farmers who expressed enthusiasm and satisfaction in relation to their choice of converting to organic farming, related the positive parts of this

to the fields and crop production, and to less extent to the herd and milk production, as expressed by farmer 3: “What I do like about being an organic farmer is to be ‘real farmer’—if one can put it that way. Be in pact with Nature, be allowed to live with the seasons of the year, have the herd and the fields—that is what we like!”

3.10. The influence of the surrounding society in relation to treatment choices

The concern for development of antimicrobial resistance has had a huge impact on the debate about use of antibiotics in Danish farming systems during the past 5–7 years. None of the farmers found this issue to be of major importance, and expressed that it definitely had no impact on their choices of disease treatment in the herd. One farmer expected that some of the un-cured mastitis cases in his herd involved antimicrobial-resistant bacteria. Generally, it was their impression (not confirmed through dialogue with the local veterinarian) that their local veterinarians had no concern in that direction neither.

The dramatic decrease in milk and meat prices appeared to have a severe impact on the farmers’ choices and perception of choices, also in relation to disease treatments, as mentioned above. The economic value of a cow for slaughter has dropped over the past few years (Benedsgaard et al., 2002). The slaughter price could in some cases equalise a caesarean made on a weekend visit by the veterinarian. This had the concrete impact on the farmers’ decision that they included the possibility of shooting cows instead of having them treated. More farmers killed bull calves systematically immediately after birth or talked about doing so in the future, because of the low meat prices. The duration of treatment was also influenced by this development: it was perceived as very expensive to call a veterinarian 2–3 times to one cow, compared to the economic value of the cow.

3.11. Farmers’ view on regulations

The regulations were perceived as difficult to understand and self-contradictory by several of the

farmers. There was very often a connection between herd problems in their own herd, and the perception of which elements in the legislation resulted in general problems or was perceived as ‘illogical’ or ‘irrelevant for organic farming’. For example, if a farmer never had more than one treatment per cow, the rule about maximum three treatments per cow per lactation seemed acceptable, whereas a farmer having problems complying with this rule would perceive it as ‘irrelevant for organic farming in general’.

4. Discussion

4.1. Treatment of acute mastitis cases

Severe, acute mastitis cases were treated by a veterinarian in all herds. The main arguments for this were animal welfare considerations, where animal welfare was understood in relation to so-called positive and negative experiences of individual animals, and pain and disease is defined as negative experience. Seen from this animal welfare perspective, it must definitely be viewed as a responsible action to treat diseased and generally affected animals. In some herds, veterinary treatment was supplemented with extra stripping out and/or peppermint ointments, but it seemed as if veterinary treatment was regarded mostly as a treatment method, which in itself was sufficient for cure. Care-taking efforts are in accordance with organic principles for the herd (Alrøe et al., 2001), and must be emphasised as one possibility for trying to improve animal welfare and prognosis in organic herds.

Farmers seemed to perceive antibiotics as the treatment method with the best prognosis in treatment of acute mastitis and other types of mastitis. The effect of antibiotics on subclinical mastitis is debated and questioned (Ekman et al., 1995; Waller and Östensson, 2002). In the scientific literature, very few alternative treatment methods are shown to have an effect on mastitis. Care taking—extra milking out and ointments causing hyperaemia—is generally expected to have a positive effect on milk flow and consequently also the healing process in mastitis. However, there seems to be a severe lack of research

and well-described experience in alternatives to antibiotic treatments.

4.2. The complicated choice related to mild mastitis symptoms

In the case of mild mastitis, animal welfare considerations are not directly involved, and the choice of treatment was based on multiple levels involving the cow and—in particular—the whole herd. In the farmers' mind, 'being organic' was a factor of minor importance for changes in herd strategies, compared the general development of the market and the farming business today. The farmers' willingness to do a time consuming effort to prevent and cure mastitis, and think in alternative ways, which would correspond with organic ideas, seemed very small among these recently converted farmers. In general, mastitis seemed to be handled in very traditional ways and with minimum effort. In a recent Danish study (Bennedsgaard et al., 2000; Vaarst and Bennedsgaard, 2001), no difference was found between the incidence of antimicrobial mastitis treatments between conventional and organic herds (on various stages of conversion). In contrast, Hovi (2001) found that 51% of organic farmers followed during a 2-year period, treated their cows with homoeopathy and in 8% of cases with other alternative treatment methods.

The choices related to the udder health situation (e.g., treatments, preventive effort, and culling) in a given herd were linked to the farmer's herd strategies, rather than the clinical characteristics of the mastitis case, except from the cases with severe, acute symptoms affecting the general condition of the cow. In the case of acute, clinical mastitis the considerations of animal welfare (defined as described above) were given a higher priority than the considerations and preferences of the farmers as well as expectations regarding the herd structure.

4.3. Inner conversion to organic farming of veterinarians and farmers

The attitude of practising veterinarians towards organic farming expressed in various ways by most farmers in this study, confirm earlier interview studies in Danish organic herds (Vaarst, 2000; Vaarst

et al., 2001; Vaarst and Bennedsgaard, 2001). The experience of veterinarians being involved only in clinical cases and in relation to concrete treatments rather than in the dialogue about herd health strategies was also expressed by Danish conventional farmers (Vaarst et al., 2002).

Vaarst (2000) showed that veterinarians generally did not experience any difference from conventional to organic dairy herds in general. In this study, they did not experience major changes during the conversion period, apart from, e.g., changes in housing system or herd size (these changes were not perceived as directly linked to 'organic farming', since anybody could build, e.g., a loose housing system).

The farmers in this study generally did not perceive major changes in their herd, and their feeling of being 'organic' was primarily connected to the land and crop production. A changed attitude to treatment criteria was articulated, but also connected to the general development in price policy in Denmark in these years. If the farmers did not perceive major changes in the attitude to the herd and treatment choices linked to organic farming, it is relevant to question how the veterinarian should perceive any changes. If neither the farmer nor the veterinarian felt that any changes towards specific organic goals were obviously and logically needed, changes cannot be expected to occur. Lund et al. (2002) concluded in an interview study with Swedish organic farmers, that the newly converted group had less understanding of the organic principles, and that the longer they had worked with organic farming, the more influenced they seemed by organic values.

The consequences of the changed attitude (linked to price policy and only to a minor extent organic farming) were mostly visible at the level of mild cases, where the choices were based on cow characteristics, resource management and herd strategies.

It appears from the results of this study that relatively few changes have taken place in the farmers' criteria for calling veterinarians at acute mastitis cases. Veterinarians were involved primarily in treatment of acute disease, and to a less extent development of herd strategies. If the veterinarian is only invited—so to speak—by the farmer to participate in the choices and discussions related to individual treatment cases, the perspectives of herd

related treatment choices and development of herd strategies may not be visible to the veterinarian at all. There is consequently not much room for development of common understanding of organic farming and relations between organic principles and herd health management.

4.4. *Future perspectives for development of treatment strategies in organic dairy herds*

Based on these interviews, it seems as if organic dairy farming faces major challenges regarding integration of organic ideas into udder health strategies. Since most choices are taken on herd level and based on the expectations and preferences linked to a herd strategy, one of the major challenges is to develop decision support in terms of herd individual data analyses, which can be used in a regular evaluation of the herd health situation. The situation where the farmer does not have a systematic way of estimating whether his or her goals are met by the practised herd strategies seems very unsatisfying. The whole situation of lacking dialogue with the veterinarian—as one of the herd health professionals with expected insight in mastitis handling—and no health plans or explicit goals for most of the herds also seems to offer major challenges to farmers, and in particular to veterinarians. The farmers perceived minor changes in relation to the herd during the two first years of conversion as a result of being organic. ‘Organic farming’ does obviously not seem to be something automatically introduced in the daily life of the farmer in the herd within few months or years, if not developed actively and closely related to the characteristics and strategies of the particular herd by the farmer. The farmer—and when relevant in collaboration with the veterinarian—carries the responsibility for establishing the herd and the management routines and daily choices in accordance with organic ideas and goals.

5. Conclusion

In the first 2 years of conversion, antimicrobial treatment was the dominant treatment method related to acute mastitis cases in a number of Danish organic herds, and antimicrobial treatment was regarded as

the most responsible treatment of mastitis, giving the best prognosis for cure. In these herds, treatment of acute mastitis cases, in which the cow was perceived as ill was based on animal welfare considerations. Most other treatment choices were based on farmer’s perception and expectations with regard to maintaining the present structure of the herd (e.g., size, distribution of age groups, calving patterns and milk yield) as a part of the entire farm. Minor changes took place with regard to treatment choices during the first 2 years of conversion. In the cases where treatment patterns were changed, it could primarily be explained by changes in priorities linked to the herd strategy, or the general development of price levels in Denmark these years, and only to a minor degree to the conversion to organic farming. Being organic was mostly experienced as a change in farm structure and in relation to crop production and changes in housing system, herd size, or other major structural changes. Veterinary involvement in mastitis treatment choices were limited to acute cases, not including systematic discussions (e.g., health planning) about choices on herd level. Veterinary involvement was not perceived as something, which promoted the development of the ‘organic characteristics’ or goals on herd or management level.

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References

- Alrøe, H.F., Kristensen, E.S., 2002. Towards a systemic research methodology in agriculture. Rethinking the role of values in science. *Agric. Human Values* 19, 3–23.
- Alrøe, H.F., Vaarst, M., Kristensen, E.S., 2001. Does organic farming face distinctive livestock welfare issues?—A conceptual analysis. *J. Agric. Environ. Ethics* 14, 275–299.
- Andersen, H.J., Aagaard, K., Skjøth, F., Rattenborg, E., Enevoldsen, C., 2000. Integration of Research, Development, Health Promotion, and Milk Quality Assurance in the Danish Dairy Industry. In: Salman, M.D., Morley, P.S., Ruch-Gallie, R.

- (Eds.), Proceedings, 9th Symposium of the International Society for Veterinary Epidemiology and Economics, Colorado, USA, pp. 258–260.
- Anonymous, 1998. Editorial. *Danish Vet. J.* 81, 337.
- Anonymous, 2000. EU Regulations, 1804/99, Brussel.
- Augstburger, F., Zemp, J., Heuser, H., 1988. Vergleich der Fruchtbarkeit, Gesundheit und Leistung von Milchkühen in biologisch und konventionell bewirtschafteten Betrieben. *Landw. Schweiz* 1, 427–431.
- Bennedsgaard, T.W., Thamsborg, S.M., Vaarst, M., 2000. Anvendelse af veterinære lægemidler [Use of veterinary medicine. In Danish]. In: Kristensen, E.S., Thamsborg, S.M. (Eds.), Vidensyntese om sundhed, velfærd og medicinbehandling ved omlægning til økologisk drift [Synthesis of knowledge focusing on animal health, welfare and medical use during conversion to organic farming. In Danish]. Danish Research Centre for Organic Farming, Report No. 6, pp. 125–134.
- Bennedsgaard, T.W., Thamsborg, S.M., Vaarst, M., Enevoldsen, C., 2002. Eleven years with organic dairy production in Denmark: herd health and production in relation to time of conversion and with comparison to conventional production. *Livest. Prod. Sci.* 80, 121–131.
- Ekman, T., Franklin, A., Hallén, S., Jonsson, P., 1995. Antibiotikapolicy vid behandling av mastit hos ko—'revisited'. [Antibiotic treatment policy related to the treatment of mastitis in cows—revisited. In Swedish]. *Swedish Vet. J.* 47, 665–669.
- Hovi, M., 2001. Alternative therapy use on UK organic farms—constraints and pitfalls. In: Hovi, M., Vaarst, M. (Eds.), Positive health: Preventive measures and alternative strategies. Proceedings of the Fifth NAHWOA Workshop, Rødding, Denmark, November 2001, pp. 7–13.
- Hovi, M., Roderick, S., 1999. Mastitis in organic dairy herds—results of a two-year survey. In: Mastitis. The Organic Perspective. A One-Day Conference on Current Research, Prevention, Treatment and Alternative Solutions for the Dairy Sector. Friday 3 September 1999. Proceedings, The Soil Association in Association with University of Reading, MAFF, p. 6.
- Krutzinna, C., Boehncke, E., Herrmann, H.-J., 1996. Die Milchviehhaltung im Ökologischen Landbau. *Ber. Ldw.* 74, 461–480.
- Lund, V., 2000. Is there such a thing as 'organic' animal welfare. In: Hovi, M., Trujillo, G. (Eds.), Proceedings of the Second NAHWOA Workshop, Córdoba, 8–11 January, 2001, Diversity of Livestock Systems and Definition of Animal Welfare, pp. 151–160.
- Lund, V., Hemlin, S., Lockeretz, W., 2002. Organic livestock production as viewed by Swedish farmers and organic initiators. *Livest. Prod. Sci.* (submitted).
- Offerhaus, E.J., Baars, T., Grommers, F.J., 1993. In: *Gezondheid en vruchtbaarheid op biologische bedrijven* [Health and fertility in biological farms. In Dutch]. Louis Bolk Institute, Driebergen, The Netherlands.
- Spranger, J., 1998. Richtlijnengemåbe Prävention und Therapie in der Tierhaltung des Ökolandbaus am Beispiel der Mastitis der Kuh. *Dtsch. Tierärztl. Wschr.* 105, 321–323.
- Strauss, A., Corbin, J., 1990. *Basics of Qualitative Research. Grounded Theory Procedures and Techniques*. Sage Publications, USA, p. 270.
- Vaarst, M., 2000. 'Omlægning til økologisk drift set fra dyrlægers og konsulenterens synsvinkel' and 'Landmændenes oplevelse af omlægning til økologisk drift' ['Conversion to organic farming from the veterinarians' and agricultural advisors' point of view' and 'Farmers' experience of conversion to organic farming. In Danish]. In: Kristensen, E.S., Thamsborg, S.M. (Eds.), Vidensyntese om sundhed, velfærd og medicinbehandling ved omlægning til økologisk drift [Synthesis of knowledge focusing on animal health, welfare and medical use during conversion to organic farming. In Danish]. Danish Research Centre for Organic Farming, Report No. 6, pp. 15–63.
- Vaarst, M., Bennedsgaard, T.W., 2001. Reduced medication in organic farming with emphasis on organic dairy production. *Acta Vet. Scand., Suppl.* 95, 51–57.
- Vaarst, M., Alban, L., Mogensen, L., Thamsborg, S.M., Kristensen, E.S., 2001. Health and welfare in Danish dairy cattle in the transition to organic production: problems, priorities and perspectives. *J. Agric. Environ. Ethics* 14, 367–390.
- Vaarst, M., Paarup-Laursen, B., Houe, H., Fossing, C., Andersen, H.J., 2002. Farmers' choice of medical treatment of mastitis in Danish dairy herds based on qualitative research interviews. *J. Dairy Sci.* 85, 992–1001.
- Verhoog, H., 2000. Defining positive welfare and animal integrity. In: Hove, M., Trujillo, G. (Eds.), Proceedings of the Second NAHWOA Workshop, Córdoba, 8–11 January, 2001, Diversity of Livestock Systems and Definition of Animal Welfare, pp. 108–119.
- Waller, K.P., Östenson, K., 2002. Om mastitdefinitioner och antibiotikabehandling vid subklinisk mastit [About mastitis definitions and antibiotic treatment of subclinical mastitis. In Swedish]. *Swedish Vet. J.* 54, 319–320.
- Weller, R.F., Cooper, A., 1996. Health status of dairy herds converting from conventional to organic farming. *Vet. Rec.* 139, 141–142.