Actisaf trial

Actisaf field trial - Veilskovgaard, Denmark

Summary

Throughout a test period (August 9 - November 28, 2010) each lactating cow in a high yielding Danish dairy herd was fed 5g of Actisaf per day. The cows were fed a traditional mixture of grass and maize silage supplemented with concentrates. There were no major feed shifts in the trial period.

Before the onset of the field trial the herd had experienced problems with sore legs and hooves. The milk fat percentage was lower than usual and the cell count was too high, all factors which might indicate SARA. After introducing Actisaf the milk yield and the fat and protein percentages increased markedly. Udder health improved, with lower somatic cell counts and reduced problems with mastitis.

The figures from the farm were followed for 5 weeks after the trial period to investigate if the cessation of Actisaf use had any effect on production results. Milk yield started to decrease after the removal of Actisaf in the diet. Milk protein and fat content remained high, whilst cell count increased right away.

It appears that Actisaf had a positive effect on the dairy cows, resulting in increased milk yield with higher fat and protein percentages, and better udder health.

Table 1. Key figures: average of the 12 months prior to onset of trial (National Animal Registration 10/08/10)

Number of cows	160
Race	Danish Holstein (SDM)
Milking system	Milking parlour
Milking frequency (milkings per cow /day)	2 (2x3 hours)
Average milk yield (kg ECM*/year/cow)	11,476
Fat %	4.10
Protein %	3.40
Somatic cell count	369,000
Dairy consultant	Ove Rugager Madsen, LRØ

* ECM = Energy corrected milk

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The housing

Cows are housed in a loose housing system with slatted floors and rubber mats in the beds. The dairy farm buildings are from around 1980. At one end there is a deep litter area where about twenty cows (randomly selected) are placed every day after milking. There is no strategic grouping of the cows and they are milked twice a day in the milking parlour (2x7).

The cows

At the onset of the trial the cows looked well and their hygiene and body condition score was, on average, good. There was a high management standard. There had been some problems with legs and hooves, and SARA was suspected. Sodium bicarbonate had been recommended by the farm's dairy consultant, but instead Actisaf was introduced.

The feed

Cows are fed a TMR of maize and grass silage and rapeseed cake (Table 2 and 3). Automatic feeders are placed in the loose area of the housing and concentrates are adjusted to each cow (Table 4). The overall feed plan is optimized according to Danish norms. The cows have a good appetite and the feed efficiency is about 86% (Table 5, 6 and 7).

Table 2: Composition of TMR, August 2010

Feedstuff	FU*	% of FU	kg total	% of kg	% of DM
Maize silage	9.0	52.3	32.8	64.0	54.2
Grass silage	5.0	29.1	14.6	28.5	29.1
Rapeseed cake	3.0	17.4	2.8	5.5	12.7
Hay silage	0.2	1.2	0.5	0.9	1.2
Urea (g)	-	-	0.1	0.3	0.7
Limestone (g)	-	-	0.1	0.2	0.4
Mineral (g)	-	-	0.3	0.6	1.6
Total	**17.2**	**100**	**51.3**	**100**	**100**

* FU = Feed Units (in this particular ration: 0.34 FU/kg feed)

Table 3: Nutritional ingredients of TMR

Parameter	
Dry matter	38.5 %
Protein	126 g/FU
PBV	-0.6 g/FU
AAT	99 g/FU
Sugar	67 g/FU
Starch	208 g/FU

Table 4: Nutritional ingredients of concentrate pre-mix (MajsBasis 3MF, DLG)

Parameter	
Crude protein	32.5 %
Crude fat	12.0 %
Digestible crude protein	260 g/FU
AAT	120 g/FU
PBV	130 g/FU
Fatty acid	51 g/FU
Starch	55 g/FU
Digestible cell walls	200 g/FU
Fat, vegetable	1.7 %
Minerals	0.7 %
Vitamins	0.2 %

Table 5: Control of feed efficiency, 168 cows including 15 dry cows (August 2010)

Feed control Feedstuff	Plan/budget FU	FU/cow	Realised kg total	FU total
Maize silage	8.1	9.1	5576	1530
Grass silage	4.6	5.1	2483	850
Rapeseed cake	2.7	2.7	481	511
Barley corn	1.5	1.5	297	281
Concentrate	2.0	2.1	295	348
Hay silage	0.2	0.2	94	39
Urea (g)	123	143	24	-
Limestone (g)	70	83	14	-
Mineral (g)	280	321	54	-
Total/average	**19.1**	**21.2**	**9318**	**3559**

Table 6: Control of feed efficiency, nutritional composition (August 2010)

Feed components Per cow/day	Unit	Realised	Norm (Denmark)	
			Min	Max
FU	FU	21.2	20.3	-
AAT	g per FU	99	89	-
PBV	g per FU	9	-3	50
Fatty acids	g per FU	34	18	51
Sugar	g per FU	63	-	295
Starch	g per FU	218	-	289
Digestible cell wall	g per FU	344	260	-
Chewing time	min per FU	36	33	-
Calcium	g per FU	8.7	6.6	-
Phosphorus	g per FU	4.7	3.8	-
Magnesium	g per FU	2.7	1.6	-

Table 7: Feed efficiency control (August 2010)

Key numbers	Unit	Plan	Realised
Feed efficiency	%		86*
kg ECM per FU	kg	1.58	1.49
Milk production			
Total milk production	kg	5031	5231
Fat	%	4.05	4.10
Protein	%	3.37	3.40
kg ECM per cow	kg	30.0	31.5

* Theoretical reachable feed efficiency = 91%

Trial procedure

A daily dose of 5g of Actisaf per cow was fed to all lactating cows for the period from August 9 to November 28, 2010 (a total of 112 days). Actisaf was mixed in the optimized mineral big bags at the pre-mixer plant (Vilomix A/S) to ensure that the mixture was consistent. Prior to the trial there had been no use of live yeast in the herd.

Results from the National Animal Registration Database have been collected in co-operation with the farm's dairy consultant. Results of animal performance from the test period are compared to results before use and after Actisaf use. This is a simple method of practical testing and useful when continuously feeding. The challenge, however, is to obtain a clear picture of the effect since as there is no control group we are left to estimate how it would have been if the cows hadn't received Actisaf.

Actisaf effect on milk yield

After a long period of slow but steady increase in milk yield in the herd, the yield increased more rapidly after the introduction of Actisaf (Figure 1). A comparison of milk yield figures from August 10 to December 7 reveal an increase in milk production from 11,476 kg ECM/year cow to 11,731 kg ECM/year cow, an increase of 255 kg ECM in a period of only 3 months (Figure 1).

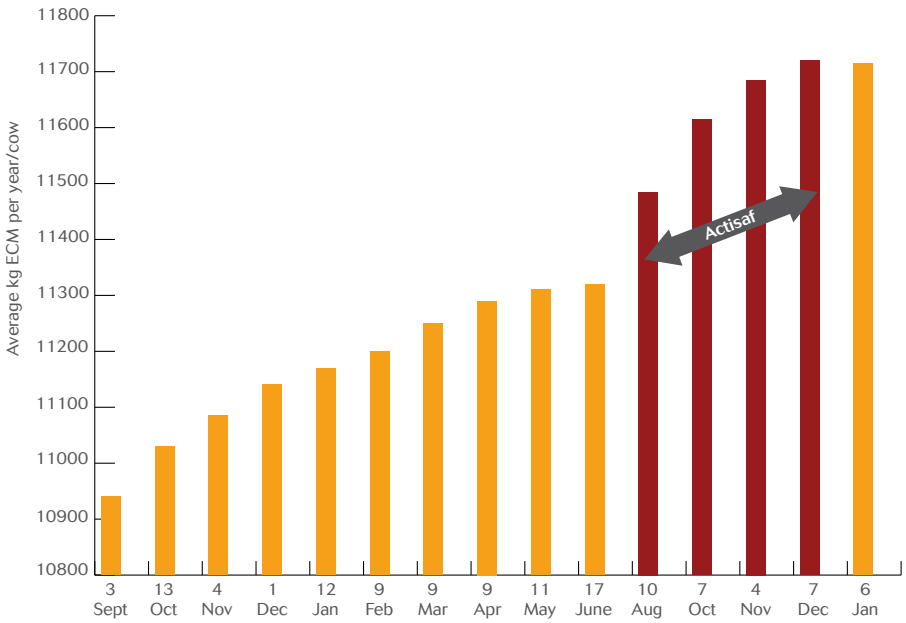


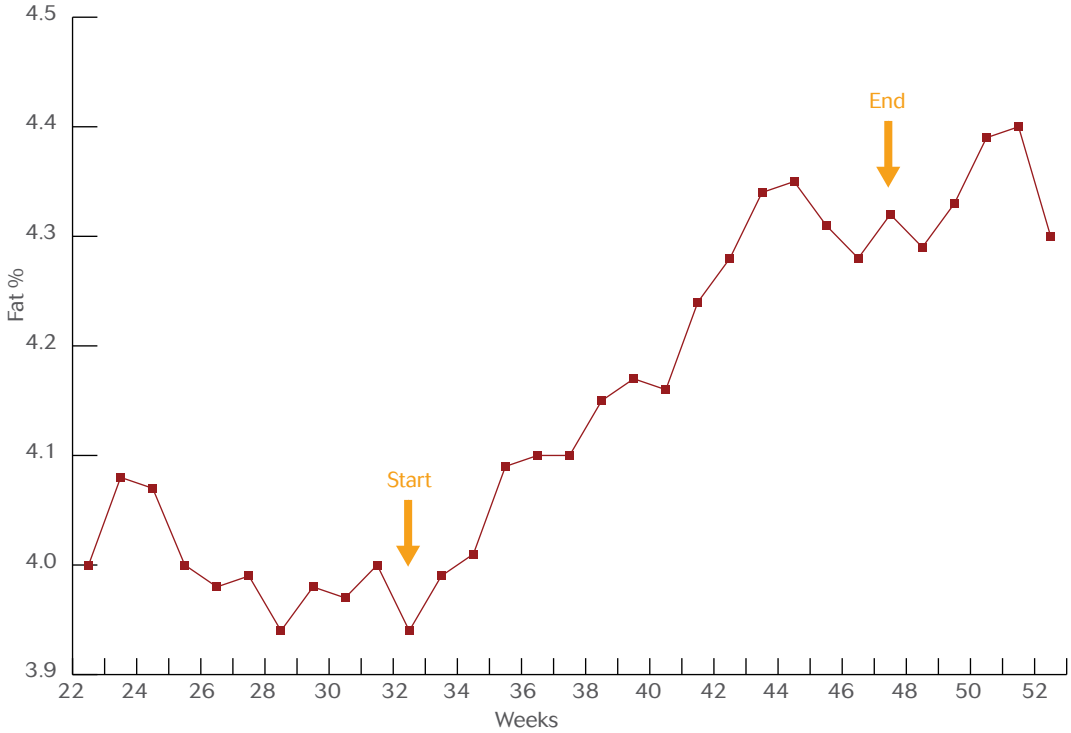
Figure 1: Average milk yield in the herd (kg ECM per year cow). Red columns represent the period of Actisaf use (data from the National Milk Control).

Actisaf effect on fat in milk

When live yeast cells are added to ruminant feed, the rumen pH stabilizes because the yeast cells stimulate the micro flora, especially the fibre-digesting and lactate-utilizing bacteria. In response the pH of the rumen environment increases which is beneficial for fat digestion. In several scientific trials a strong relationship between rumen pH and fat metabolism has been found: the lower the pH in the rumen the lower fat percentage in the milk, and vice versa.

After the introduction of Actisaf in the feed, the fat percentage in the milk increased markedly (Figure 2) which can be explained by the improved rumen environment. Live yeast cells relatively quickly disappear from the body of the cows. Experience shows that after the end of Actisaf inclusion in the diet, all yeast cells are excreted after approximately one week and thus the effect of Actisaf also disappears. In this trial the fat percentage continued to increase for a further four weeks after the exclusion of Actisaf, which indicates that it was not Actisaf alone that had the beneficial effect on the fat content in the milk.

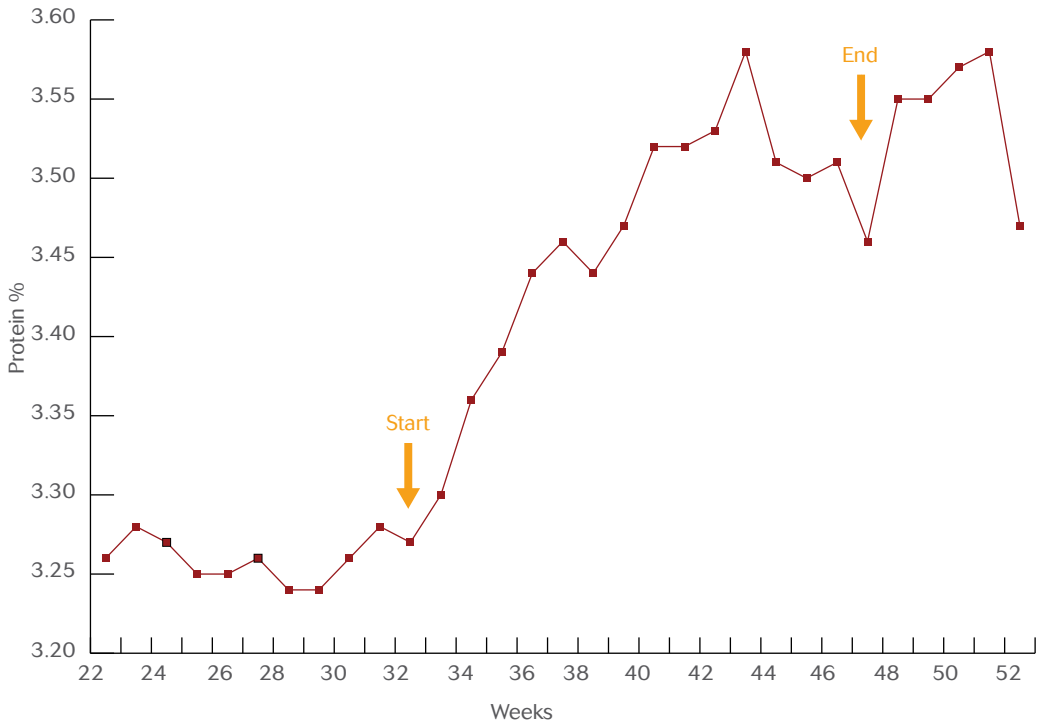
Figure 2: Milk fat percentage in the herd. The arrows mark the beginning and end of Actisaf use (data based on weekly averages).



Actisaf effect on protein in milk

It is estimated that about 70% of the protein uptake of the cow originates from the protein incorporated in microbes, called microbial protein. When the microbes pass out of the rumen, the microbial protein is absorbed in the gut and from here contributes to milk synthesis in the udder. Actisaf increases the total number of microbes in the rumen and the amount of microbial protein increases, hence increasing the amount of protein available for the cow. This might explain the marked increase of protein in the milk which appeared after the introduction of Actisaf in the feed (Figure 3). Nevertheless protein content remained high even after end of Actisaf use.

Figure 3: Milk protein percentage in the herd. The arrows mark the beginning and end of Actisaf use (data based on weekly averages).



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Actisaf effect on health

Another beneficial effect of Actisaf is on the animal's health. When the cow's rumen is functioning well then the cow is healthier. The cell count is a measure of the presence of white blood cells in the milk; the higher the cell count the more likely it is that there is an infection in the udder. As seen in Figure 4 the cell count decreased from 397,000 to 236,000 after the introduction of Actisaf (a reduction of 40%). In the same period an improved milking regime was introduced, which might account for some of this effect, but it is interesting to see how the cell count starts increasing again when Actisaf is removed form the diet. The decreased cell count clearly had a beneficial effect on the incidence of mastitis, which dropped to an absolute minimum after the introduction of Actisaf (Figure 5).

Figure 4: Somatic cell count in the herd. The arrows mark the beginning and end of Actisaf use (data based on weekly averages).

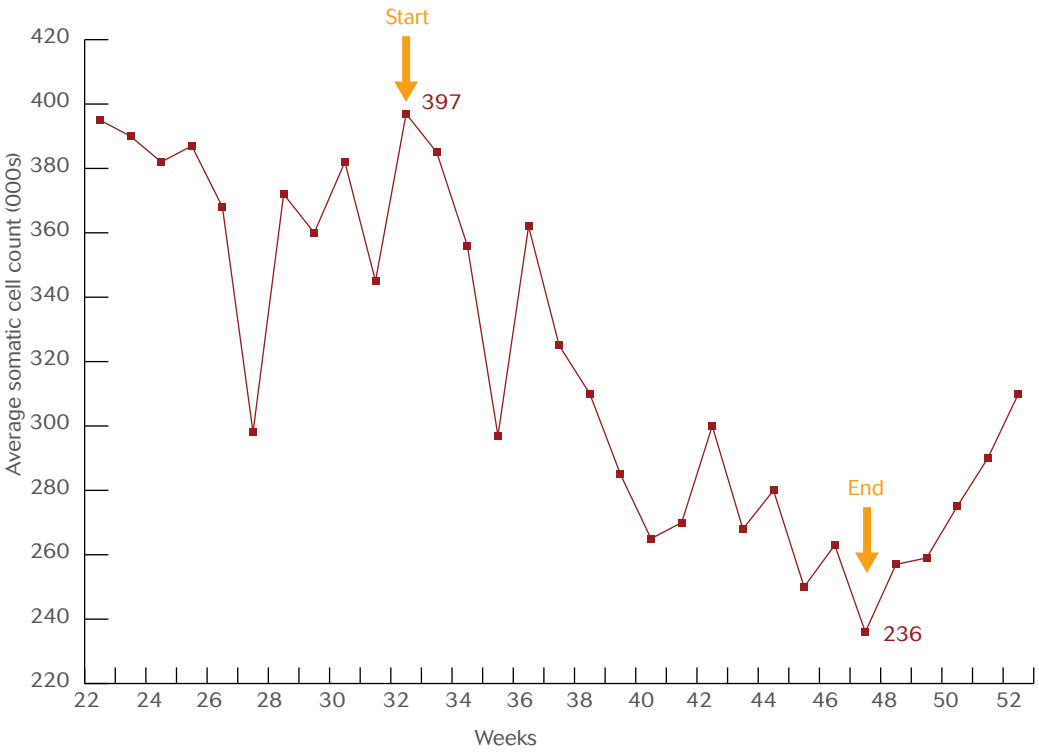
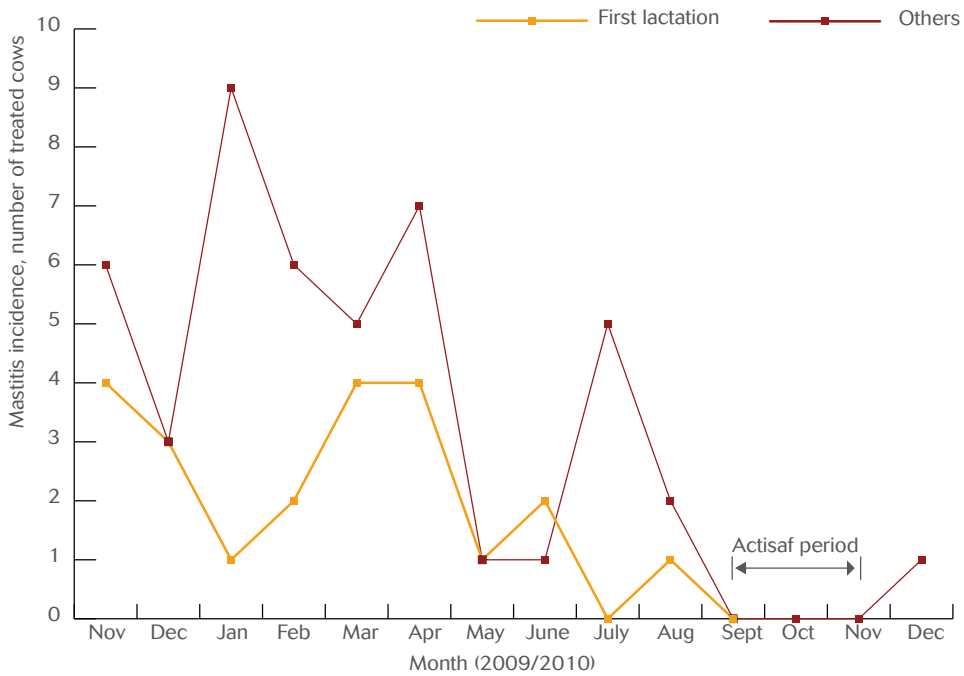
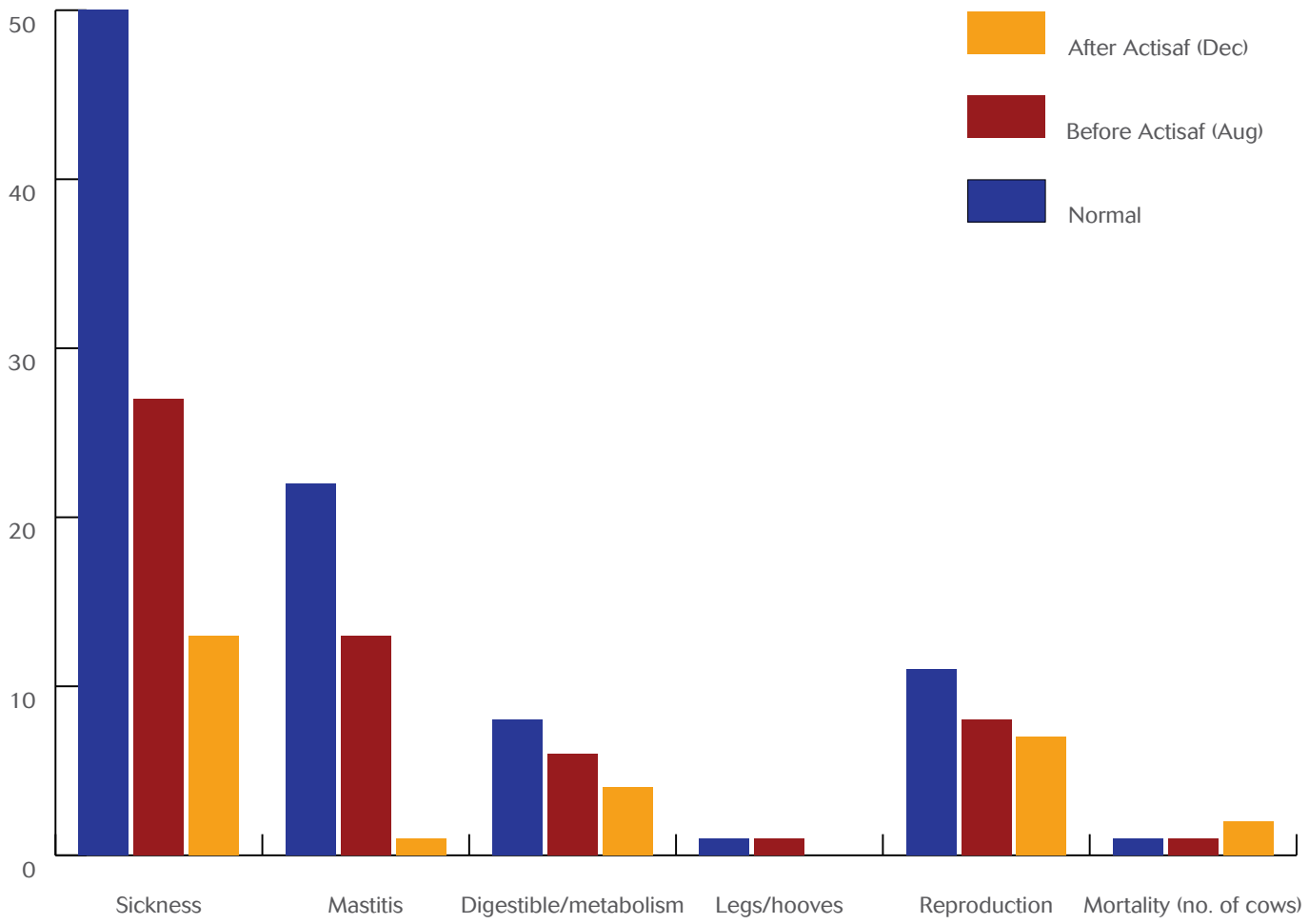


Figure 5: The number of treated mastitis cases in the herd for first lactation cows and others (data from the National Animal Registration, December 2010).



Looking at the overall health of the dairy cows, figures from the National Animal Registration reveal that herd health improved in the three month period when Actisaf was fed compared to the three months before. In particular the number of mastitis cases and illness due to digestion and metabolism issues were reduced (Figure 6).

Figure 6: The key figures for health of the dairy cows in the three month period before and during Actisaf inclusion, and the corresponding distribution of health issues.



Conclusion

In this field trial, Actisaf has been shown to be an effective buffer in the feed ration for high yielding dairy cows. The cows' health improved during the trial with a significant effect on udder health: reduced cell counts and decreased incidence of mastitis were seen. At the same time milk yield increased and there was a marked effect on the fat and protein percentage in the milk.

When the Actisaf supplementation ceased, milk yield started to decrease and the somatic cell count immediately increased, however fat and protein percentages remained high in the weeks after Actisaf use. The cows certainly benefitted from the improved health status acquired in the trial period, which might have a more profound influence on the milk quality.

Whether the improved udder health in the herd can be attributed to Actisaf alone is uncertain, since an improved milking regime was initiated in the same period as the Actisaf was introduced. However, the increase in cell count that appeared after the Actisaf supplementation finished prompted the farmer to include Actisaf on his own initiative, with such a positive result that he now includes it as a permanent additive in his feed.

Finally, there can be no doubt that production results noticeably improved during the trial period of Actisaf supplementation. Milk production went up but not at the expense of the health of the cows.

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