

Effect of lameness on economic parameters in Holstein-Friesian cows

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Abstract: Lameness has a detrimental effect on herd productivity, and is second only to mastitis in this respect. The objective of this study is to calculate the cost of different types of lameness. This would enable effective decision making of whether it may or may not be economically optimal for a cow to be kept in the herd, inseminated, culled or replaced.

The animals included in the survey were reared in different variants of free-range production systems. For the purposes of the study, cows from three farms were divided into two groups—cows with diagnosed lameness, and healthy cows over the 305-day lactation period.

According to the results of the survey, the revenues from dairy cows with lameness were reduced by up to 15%, whereas the expenses per animal were higher by up to 17%. Treatment costs of affected cows were increased from 1.5 times at the second farm to 17.3 times at the third farm. The absolute economic results (profit per cow) in lame cows were reduced by 23.8% at the second farm and by 28.9% at the first farm. Cost effectiveness in healthy cows was by 11.6% higher for the second and by 32.6% higher for the first farm. The production costs of 1 litre milk in lame cows were increased by 17.1% (third farm) and by 29.3% (second farm).

Key words: dairy farm, dairy cows, lameness, profit, profitability, production costs

1. Introduction

Lameness is a major problem for dairy cows resulting in substantial reduction of milk yields and poor economic results. Ganchev and Mitev (1997) outlined that the prevalence of foot diseases among cattle was 10–15% and that their economic impact was similar to that of serious problems as mastitis and infertility. Lameness causes significant economic losses at farms due to lower milk yield, difficult or impossible mating, additional costs for medications, labour costs and early culling of animals. Similar opinions have been reported also by other researchers (Logie, 1997; Olsen, 1997; O’Callaghan, 2002; Penev, 2011; Penev et al., 2012).

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According to Simbirtsev and Terehov (1982), losses of milk in cows with lameness could vary between 5 and 30% depending on the clinical manifestation of pain. Another investigation shows that depending on the severity of lameness, milk losses could be from 25 to 75% (Rousseau, 1987). Cows were shown to reduce their milk production even before lameness became overt (Warnick et al., 2001; Green et al., 2002).

Several economic analyses demonstrated the negative impact of lameness on the farm budgets. In the Netherlands, cattle farm incomes have been reduced by 4–5% because of lameness (Enting et al., 1997).

Weaver et al. (2005) outlined that lameness could incur higher financial losses from infertility—34%, lower milk yields—25%, death or preliminary culling—13%, additional labour costs—13%, veterinary costs—8%, body weight loss—6%.

Penev (2013) established that severe and prolonged lameness between the 61st and 200th lactation days exerted a considerable negative effect on milk yield and reproductive performance of dairy cows through increasing calving intervals and the number of inseminations per conception.

The purpose of the present study was to evaluate the effect of lameness on economic parameters of Holstein-Friesian cows at three dairy farms with different average productivity and free-range production system variants.

2. Material and methods

The survey was conducted with cows at three dairy farms reared under different technological variants of free-range production systems. Herd 1 was reared in a common yard and barn with deep straw bedding. The second herd was housed in individual cubicles for rest, on rubber mat flooring. In the third barn, individual cubicles were bedded with compost with chopped straw. The cows at all farms were fed total mix rations, offered *ad libitum*. All cows included in the survey were from the Holstein-Friesian breed.

For analysis, data for 100 cows from each farm were collected. The sample included 10 primiparous cows, 20 second-lactation cows, 30 third-lactation cows and 40 cows at fourth or higher lactation.

At each of the farms cows were divided into two groups: first group—with clinical lameness during the lactation and second group—healthy throughout the 305-day lactation period. The number of clinically lame cows was as followed: farm 1—38, farm 2—61, and farm 3—43.

The analysis took into account the farm revenues, expenses, cost effectiveness and production costs per 1 litre milk of diseased and healthy cows at each farm.

Results were processed with statistical techniques and the normative survey method.

3. Results and discussion

At the first farm (Table 1), the absolute economic result, i.e. the profit per cow, and the relative economic result (cost effectiveness) were higher for the healthy group. The causes could be attributed to the increased costs for hoof disease treatment and medications, which were 5.3 times higher in lame cows. On the other hand, the individual milk yield of affected cows was reduced by 89 L. The profit from healthy cows was by 28.9% higher compared to that of lame cows.

The cost effectiveness in healthy animals was by approximately 41.3% higher compared to the lame group.

A major parameter of the economic efficacy of dairy farming is the production costs of 1 L milk. In lame cows, the production costs were by 0.08 BGN higher, i.e. the price effect in healthy cows was by 11.8% higher.

Table 1. Economic parameters for cows with lameness and healthy cows at farm no. 1

Parameters	Lame cows $n = 38$ Values, BGN	Healthy cows $n = 62$ Values, BGN
Revenues	172,537	285,098
Costs, including:	117,841	159,609
– Labour costs	34,675	56,575
– Feed	54,910	89,590
– Treatment	25,900	8,000
– Water and energy	2,356	3,844
Profit	54,696	125,489
Profit per cow	1,439.37	2,024.02
Cost effectiveness	46.4	79.0
Production costs	0.68	0.55

Source: Author's own elaboration.

Data from Table 2 show that lame cows were by 36.1% more than healthy ones. The differences in economic results between the two groups were obvious. The profit per cow was by 15.2% higher in healthy animals. The costs in this group were also higher due to higher feed expenditure in unaffected cows. Despite that, in healthy cows the profit was by about 30% higher compared to lame cows. Cost effectiveness in the healthy and lame groups was 71.4% and 59.8%, respectively. As could be expected, the production costs were by 6.89% higher in diseased cows.

Table 2. Economic parameters for cows with lameness and healthy cows at farm no. 2

Parameters	Lame cows $n = 61$ Values, BGN	Healthy cows $n = 39$ Values, BGN
Revenues	291,280.80	219,546.21
Costs, including:	182,264.50	128,110.5
– Labour costs	55,662.50	35,587.50
– Feed	95,770	78,105
– Treatment	27,050	12,000
– Water and energy	3,782	2,418
Profit	109,016.30	91,435.70
Profit per cow	1,787.15	2,344.50
Cost effectiveness	59.81	71.37
Production costs	0.62	0.58

Source: Author's own elaboration.

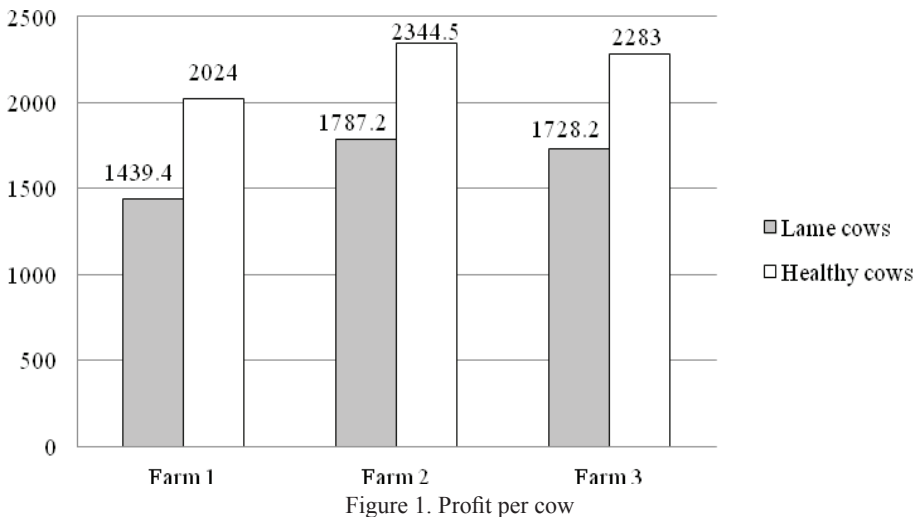
Table 3. Economic parameters for cows with lameness and healthy cows at farm no. 3

Parameters	Lame cows $n = 43$ Values, BGN	Healthy cows $n = 57$ Values, BGN
Revenues	204,501.76	292,039.22
Costs, including:	130,188.50	161,911.50
– Labour costs	39,237.50	52,012.50
– Feed	62,135	82,365
– Treatment	26,150	2,000
– Water and energy	2,666	3,534
Profit	74,313.26	130,127.72
Profit per cow	1,728.22	2,282.94
Cost effectiveness	57.08	80.37
Production costs	0.63	0.55

Source: Author's own elaboration.

At farm no. 3 the share of diseased cows was 43% from all cows. Similarly to the other two farms, the revenues from healthy cows were by 7.2% higher, the expenses—by 6.2% lower, and the profit—by 24.3% higher compared to respective parameters in lame cows. The cost effectiveness in the healthy group was 80.3% versus 57.1% in the lame group. The production costs of 1 L milk were by 0.08 BGN lower in healthy cows.

Figure 1 shows that the absolute economic result (profit per cow) at the three surveyed farms was superior in healthy groups. Thus, the profits were higher compared to lame groups by 28.9% (farm 1), 23.8% (farm 2) and 24.3% (farm 3).



Source: Author's own elaboration.

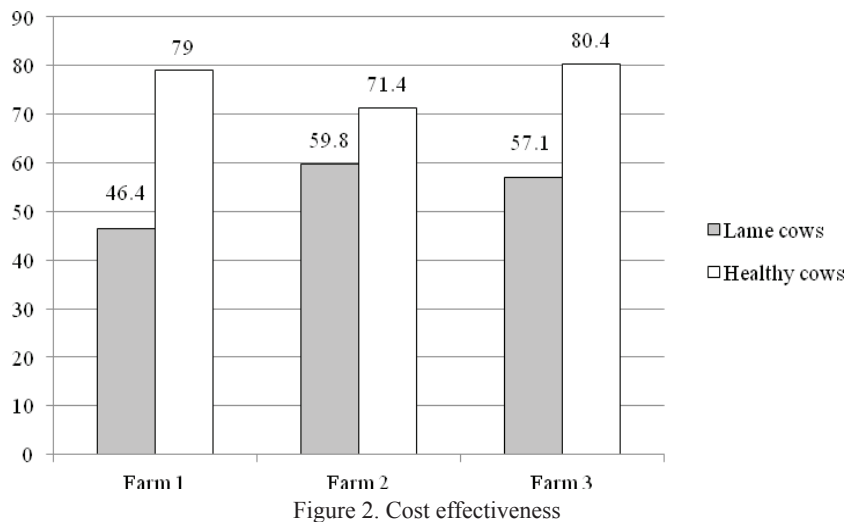


Figure 2. Cost effectiveness

Source: Author's own elaboration.

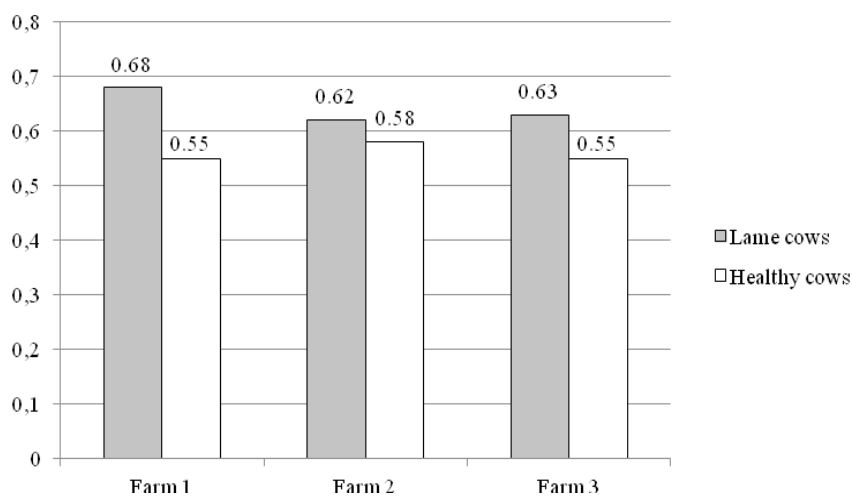


Figure 3. Production costs of 1 L milk

Source: Author's own elaboration.

As shown in Figures 2 and 3, the cost effectiveness at all farms was considerably higher in healthy animals, most obviously marked at farm 1. With respect to production costs, the effect of hoof disorders was most pronounced at farm 2.

Comparable results have been reported by Simbirtsev and Terehov (1982), and Rousseau (1987).

The present results demonstrated that lameness is one of primary negative factors leading to significantly poor economic results in dairy cattle farming.

4. Conclusions

The present results showed that the revenues from cows with clinical lameness at all three farms were by up to 15% lower, whereas the expenses per cow—by up to 17% higher. The treatment costs of diseased cows were by 1.5 times higher at the second farm and by 17.3 higher at the third farm.

The absolute economic results (profit per cow) and relative economic results (cost effectiveness) were higher in the healthy groups. The production costs of 1 litre milk were by 6.9% to 11.8% higher in lame cows.

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Wpływ kulawizn u krów rasy holsztyńsko-fryzyskiej na parametry ekonomiczne

Abstrakt: Występowanie kulawizn u krów ma negatywny wpływ na produktywność stada i jest drugim po zapaleniu wymienia czynnikiem w tym zakresie. Artykuł prezentuje szacowany koszt różnego rodzaju kulawizn, co pozwoli podjąć optymalną z ekonomicznego punktu widzenia decyzję, czy zainfekowana krowa

powinna pozostać w stadzie, czy też powinna zostać wymieniona lub poddana inseminacji. Zwierzęta objęte badaniem były hodowane w różnych wariantach systemów produkcji na wolnym wybiegu. Dla celów badawczych krowy w trzech gospodarstwach zostały podzielone odpowiednio na dwie grupy – krowy ze

zdiagnozowaną kulawizną oraz krowy zdrowe. Krowy z obydwu grup były w okresie trzystąpiędniowej laktacji. Po przeprowadzeniu badania stwierdzono, że zysk z krów mlecznych ze zdiagnozowaną kulawizną został zmniejszony o 15%, podczas gdy wydatki na zwierzę były wyższe o 17%. Koszty leczenia wzrosły od 1,5 razy w drugim gospodarstwie do aż 17,3 razy w trzecim. Całkowite zyski ekonomiczne (zysk

na jedną krowę) u krów ze zdiagnozowaną kulawizną zostały zredukowane o 23,8% w drugim badanym gospodarstwie oraz o 28,9% w pierwszym. Ekonomiczna opłacalność zdrowych krów była wyższa o 11,6% w drugim gospodarstwie oraz o 32,6 % w pierwszym. Koszty produkcji jednego litra mleka u krów z kulawizną wzrosły o 17,1 % (trzecie gospodarstwo) i 29,3% (drugie gospodarstwo).

Słowa kluczowe: mleczarnia, krowy mleczne, kulawizna u krów, zysk, rentowność, koszty produkcji
