Animal welfare, etológia és tartástechnológia

Animal welfare, ethology and housing systems

THE DISTANCE BETWEEN FRONT TEAT AND ITS INFLUENCE ON MILK PRODUCTION IN HOLSTEIN COWS

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Abstract

The objective of this study was to examine influence of distance between front teats on some lactation in Holstein cows. 116 cows was measured right after afternoon milking in milking parlour. By means of distance between front teats, we divided measured cows in 3 groups (A: 5-12 cm, B: 13-20 cm, C: 21-27 cm). The milk yield data were taken from milking parlour computer.

We have foud following relationships between teat distance and milk yield: in group A r= 0.25; in group B r= 0.43; in group C 0.27 and totally r= 0.53. We also have found statistically significant differences (P<0.01) between all three groups, it means that C group with biggest distance has had the best milk yield.

Keywords: distance between teats, milk yield, Holstein,

Introduction

The mammary gland is one of a few body organs that undergo repeated cycles of structural development, functional differentiation and regression (*Hurley and Ford*, 2002). In dairy breeds the udder it is usually well developed and it is synonym for milk production, so it deserves a big attention in dairy breeding programs.

There were a lot of studies that described different phenotype characteristics and its relationships with some productive characteristics in dairy cattle, what was major breeder's instrument in improvement of livestock, until progress in genetics did not take main role. Udder conformation is nearly related to some other productive characteristics and breeding methods.

Rogers et al. found favourable moderate genetic correlations of udder traits and SCC. Genetic improvement of teat placement, length of fore udder and udder depth (tight udder) has a positive effect on udder health, measured as lowering SCC (*Thomas et al*. 1984; *Monardes et al*. 1990; *Rogers et al*. 1991).

On the phenotypic level, non-linearity between type traits, milk yield and herd life was found in American Holsteins (*Foster et al*. 1989) and between type traits and milk yield in five other American dairy breeds (*Norman et al*. 1988).

With the metabolic stress of high performance and the physical effects of being milked and handled two or three times daily, it is not surprising that the udder and teats are subject to a wide variety of disorders (*Blowey et al*. 2003). Anatomical position of teas could have a significant influence on milk production, especially if animals are placed on farms with robotic milking.

Norman et al. (1988) showed that the phenotypic relationship between linear type traits and milk yield is often non-linear, a finding which was even consistent across various dairy breeds and traits. E.g., they observed a significant non-linearity between milk yield and udder depth (Jersey, Guernsey, Ayrshire), rear udder width, rear udder height, dairy character, final score (Jersey, Guernsey), fore udder attachment (Jersey, Brown Swiss) and stature (Jersey, Guernsey and Shorthorn). In Holsteins (*Foster et al*. 1989) significant non-linearity was found between dairyness, udder depth, rump width, rear udder, fore and rear teat placement and first lactation herd mate deviations for milk as well as between stature, udder depth, rump width, milkout and herd life. However, in both studies the regression was calculated from milk yield on type traits.

So it is the most important to find the best way how to utilise cow's capacity and to accomplish all ethic and welfare criteria considered to breeding of domestic animals.

In researches of teat morphology it is usually taken a teat length from base, thickness, or angle of teats position (inside or outside) and in some cases even distance of front teat from floor.

Materials and methods

In this study we investigated front teat distance in its relationship to milk production parameters in Holstein-Friesian breed. Cows were among first and fourth lactation. Average weekly milk yield and milk composition parameters were related to front teat distance. It was measured 116 cows. Cows was measured right after afternoon milking in milking parlour. By means of distance between front teats, we divided measured cows in 3 groups (A: 5-12 cm, B: 13-20 cm, C: 21-27 cm). Average herd yield was above 9500 kg/ year.

The distances between front teats were measured with plastic meter, and it was measured from inside parts of teats on the base of udder. The milk yield data were taken from milking parlour computer. We also used data from regional milk recording authority. The study was carried out at Mendel's University farm Žabčice, in December 2008-January 2009.

For the analysis we calculated, mean values of front teats distance, average weekly (7-day) milk yield, correlation between weekly milk yield and individual front teats distance, based on groups.

Results and discussion

The statistic characteristics of monitored groups of cows and correlation coefficients between teat distance and average 7-day milk yield are presented in *Table 1*. Cows in particular groups reached average 7-day milk yield 25.27 resp. 29.60 resp. 36.63 kg. The average milk production was 30.91 kg. As far as relationship between teat distance and milk yield in group A was correlation r= 0.25; in group B r= 0.43; in group C 0.27. The totally correlation r= 0.53 confirm the positive relation of shape of the udder on milk production. This conclusion is conformable with *Foster et al.* (1989).

Table 1. **Statistic characteristics of monitored groups of cows and correlation coefficients between teat distance and average 7-day milk yield**

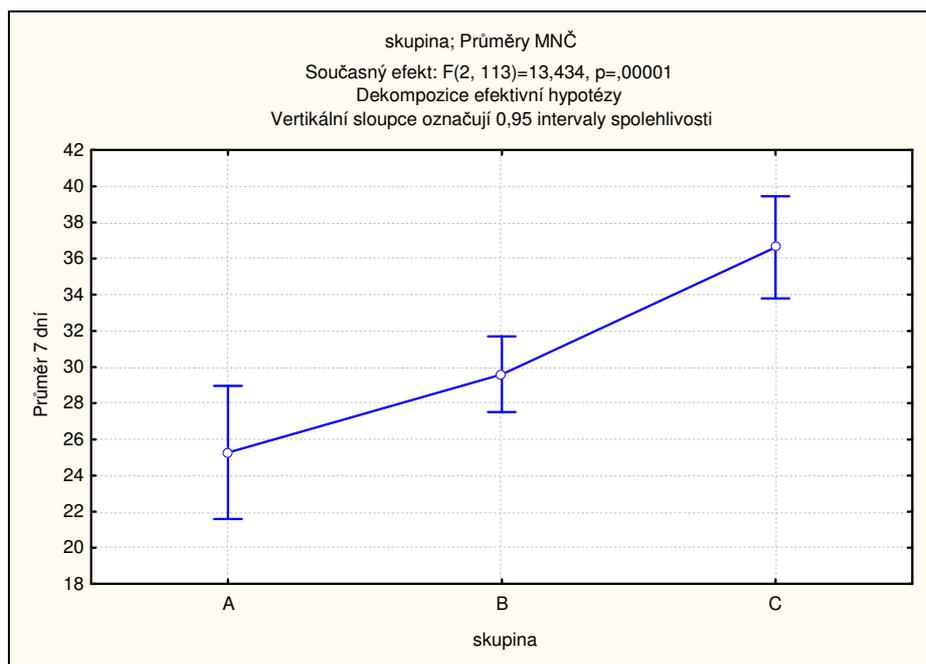| Group	n	Distance between teats				Avg. milk yield in 7 days				r
		range	mean	s	V	mean	min.-max.	s	V	
	Pcs.	[cm]	[cm]		[%]	[kg]	[kg]		[%]	
A	20	5–15	10.00	1.76	17.6	25.27	7.7–42.1	8.28	32.8	0.25
B	62	13–20	16.16	2.33	14.4	29.60	11.9–48.6	8.23	27.8	0.43**
C	34	21–27	22.97	1.77	7.7	36.63	20.6–51.2	8.10	22.1	0.27
All cows	116	5–27	17.09	4.86	28.4	30.91	7.7–51.2	9.12	29.5	0.53**

**=P<0.01

In the *Table 2*. are presented statistical differences in milk production among groups. We have found statistically significant differences between all three groups, it means that group with biggest distance has had the best milk yield as well as *Norman et al.* (1988) state it. *Figure 1* illustrate more evidently the previous conslusion.

Table 2. Statistical differences in milk production among groups

	Group		
	A	B	C
A		0.0415 *	0.0001 **
B			0.0012 **

**=P<0.01

skupina; Průměry MNČ

Současný efekt: F(2, 113)=13,434, p=,00001
Dekompozice efektivní hypotézy
Vertikální sloupce označují 0,95 intervaly spolehlivosti

Figure 1. Confidence levels between groups divided by distance of front teats

Conclusion

By means of distance between front teats, we divided measured cows in 3 groups (A: 5-12 cm, B: 13-20 cm, C: 21-27 cm). The highest relationship between teat distance and milk yield was found in the group B (r= 0.43) but totally we found medium-strong relation r= 0.53. We also have found statistically significant differences between all three groups, it means that C group with biggest distance has had the best milk yield.

Acknowledgment

References

Cited sources are available at the authors.