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OPTIMISED DAIRY COW FEEDING ECONOMY IN HUNGARY

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Abstract: High yielder cows optimal feeding is always a major question in farm management. We attempted to find the optimal yield- and weight group in a Holstein_Freisian herd. Handled more than 2000 milk record samples and concluded that the optimal body weight is about 600-650 kg. Also step up from medium yielder to high yielder is more cost efficient than pushing the milk production over 30 kg milk daily. Our results show that fitness traits and body scores are major factors and every 50 kg of extra weight rises the forage cost in average of 0,11 €cents. The mid-weight cows produce 25 kg of milk daily but the herds are very heterogeneous. The solution should be smaller cows, homogeneous herds and optimized feeding.

Keywords: milk, cost, feeding, Freisian

Introduction

In general, worth to plan with small groups of high yielder cows to optimize the feed budget (Moran 2005). The required dry matter, home-grown feed and the amount of concentrates and by products are all affect on decision making. The forage supply and quality are also major issues, because rumen health problems may cause more unwanted difficulties. Optimal dry matter balance, the length of silage chaff and mineral supplements are corner stones in feeding as well. The quantity approach, in Hungarian milk production, is still dominate over milk solids and unfortunately dairy processors do not distinguish between family farms and big holdings. The demand drives the breeding work and this trend shows that farmers with strong capital are still looking for high yielder cows. However lameness and digestive problems cost thousands of euros therefore fitness traits (Veerkamp 1998) become more important than ever. The Hungarian average lifetime, for a high yielder dairy cow is 2,5 lactations, while in Ireland (pasture based) 3,6. High yield, good pregnancy rate, younger age and lack of health issues reduce the risk of culling (Vries 2013). Calculating the feeding budget is not an easy task, because its complexity (Musallyamova and Antonova, 2014; Heinrichs et al. 2011). Forage quality, dry matter content, available cheap silage are all major factors. As the breeding is rolling further, the high yield and body weight are positively correlating up to a certain limit. Heavy cows doesn't mean necessarily fat cows, as the big udder needs strong bones and muscles. However over 600 kilograms, heavy cows' energy balance turns toward life support (Garnsworthy and Topps 1982) and doesn't show necessarily higher milk yields. Cost effectiveness also worth to consider before setting a dairy holding, as a high yielder cow demands top quality and sufficient nutrition (Schivera 2005). Bewley and Schutz (2008) gathered all the information and published paper which discuss the relation between body score system and milk yield or it's connection with diseases. Drackley et al. (2005) reported that modern techniques like functional genomics help to unraveling the complex interactions of metabolism, immune activation, stress physiology, and endocrinology. More researches turn toward complex inspection as a nutritive component may affect different ways at the same time.

Overfeeding is a waste of forage besides health issues like hard calving or depression in appetite may occur after calving (Rukkwamsuk et al. 1999). There is a strong relation between over conditioning and diseases like fatty liver and thinner cows have less difficulties with calving. Multifactorial disease's (mastitis, ketosis, lameness) appearance rate is also higher among fat cows (Fekete 1993).

Gillund et al. (2001) stated that cows were suffering from ketosis had overweight compared with healthy ones. If a cow's condition score higher than 3.5 at calving, she is more disposed to ketosis than thiner herdmates. Schröder and Staufenbiel (2006) also reported about the danger of overconditioning during dry period. They call it fat cow syndrome. There is a high risk of infectious diseases, metabolic- and reproductive disorders.caused by increased body condition and liver fattening. Shaver (1997) has mentioned that gaining weight during dry period is very risky because metabolic malfunctions my occure. Hard calving chance increases and culling rate rises due to displaced abomasum. Boster and Boster (1998) also gathered all information about body score system and stated that dairy cows have the ability to buffer nutritional errors. Merwe and Stewart (1999) conceived the altruist nature of

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cows. High milk production energy suply based on the cow's own energy depos (*Figure 1.*).

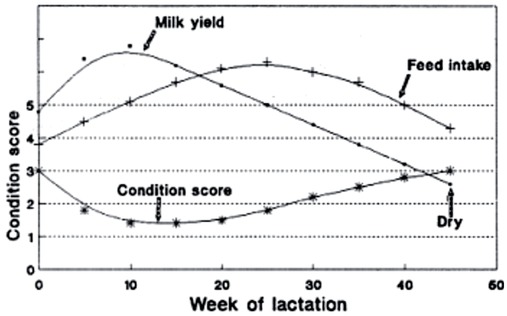

Figure 1. Relative changes in milk yield, feed intake and condition score over the lactation

Source: Merwe and Stewart, 1999

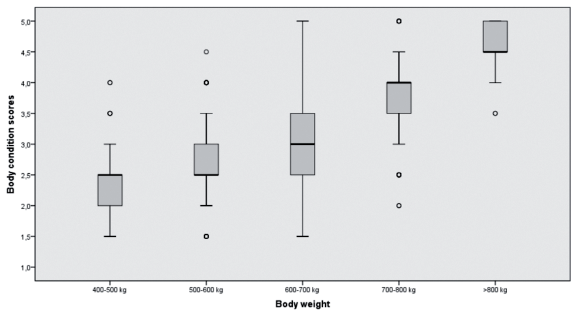

Figure 2. Body condition score distributions related with body weight

Materials and methods

Our trial farm is situated in Hodmezovasarhely, Hungary. The dairy herd consist 100 % Holstein-Friesian Hungaro-crossbreds. On farm we checked 794 cows in the first and 1778 in the second lactation. We calculated with four daily yield levels (low-14–20kg, medium-20–25kg, high-25–30kg, superb-30kg<) and optimal forage portions (in dry matters DMI) based on daily market price. We collected milk solid and quantity data and finally calculated life support and productive energy needs. Also qualified them by weight in 9 subgroups between 450–915 kg. Our calculation has been based on genetically determined BMI index and live-weight. Body weight and body condition strongly correlate and our herd also showed the average distribution around 6–700 kg (*Figure 2.*).

Condition judgement strongly based on size and weight (*Figure 3.*) and at this point management may goes wrong. High condition scored cows may have heavier body, which need more live maintenance energy and this process rises the production costs.

Results

Throughout 12 milk monitoring we have learned, as the milk yield grows more productive energy needed, based on genetics. Heavy cows also need more fibre as the massive smooth rumen muscle doesn't get stimulated enough with the increased amount of TMR grain. After the 3rd milking the life support and productive energy needs started to decline. The 500–700 kg (2–7 weight groups) live-weight is the Friesian optimum. Both the highest milk yields and optimal feeding costs appeared in this group. Most farms standardize their feeding costs on 650 kg (Holstein-Friesian) animals and calculating with 16–21 eurocents per cow daily, depends from TMR demand in different milk-groups (*Table 1.*).

The ideal body weight is somewhere 600–650 kg. Up to 30 kg of milk, every cents spent on forage is significantly rises the income. Over 30 kg, genetics regulate the system as far more feed needed for one extra unit of milk. The bottom line is, that much easier step up from medium to high yield, than exceed the genetically determined 30 kg of milk. As the body weight increases, the milk production growth is slowing down. Over 800 kg definitely flatten out (*Figure 4.*).

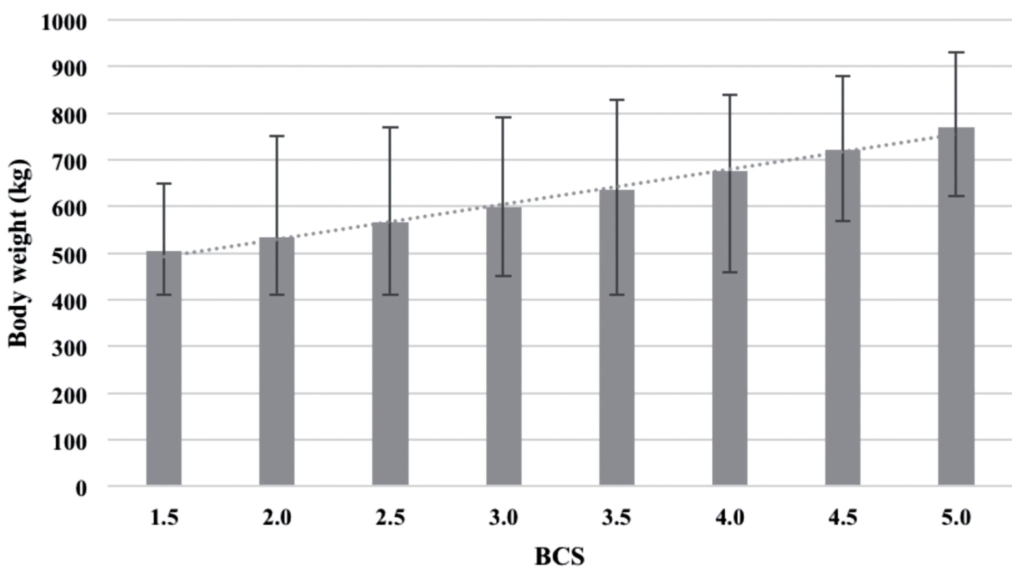

Figure 3. Relation between body score and body weight

Table 1. Calculated feed kg, dry matter intake and cost a day (body weight is 650 kg)

Groups of milk production	Feed intake (kg)/day/cow	DMI (kg)	Cost/day/cow (€)
14.0–20 kg	45.0	17.46	2.76
20.1–25 kg	37.0	18.90	3.88
25.1–30 kg	41.1	20.97	4.29
>30 kg	42.5	22.21	4.67

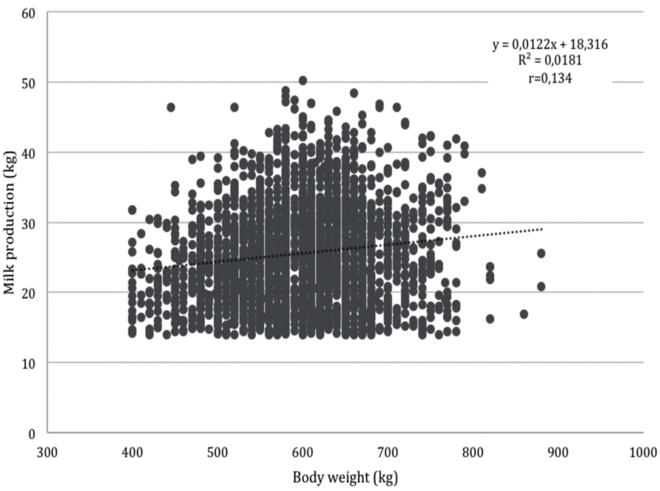

Figure 4. Body weight related milk production trend

Feeding costs similarly follow the previous equation. The minimum of €1.50/kg of milk per cow, at low milk yield could grow up to €5.60/kg of milk. The jump between low and medium yield costs are the highest (€1.30) as the genetic optimum is about 25–30 kg of milk. An extra 34 cents could lead to the high yield group, however the next jump is about 82 cents. From the lowest to the highest group the minimum extra forage cost is €2.46/kg. We have found the highest level of positive correlation (r=965) in the high yield (25–30 kg) group between feeding cost and body weight (*Table 2.)*.

The high yielder groups had the smallest deviation in body weight, but in feeding cost, the high energy demand meant greater deviation in daily outcomes (Table 3). This could be simply because some cow compensate better than others in forage transformation. This is where genetics comes in. Farmers should aim the homogeneous livestock to avoid big jumps in production. High genetic value cows are very expensive but they should handle as long term investments. Long term means 5–6 lactations minimum, against the current trend, which is about 2–2,5 lactations.

Conclusion

Eventually the issue of feeding cost and farming with heavy cows is a scale game. The perfect size cow is a genetic question but to maintain her life-support demand and get extra

Table 2. Correlation with body weight, milk production, daily feeding cost

Groups of milk production	parameters	Body weight	Milk production	Feeding cost/day/cow
14.0–20 kg	Body weight	1	–.047	.947**
	Milk production	–.047	1	.088*
	Feeding cost/day/cow	.947**	.088*	1
20.1–25 kg	Body weight	1	.044	.958**
	Milk production	.044	1	.078*
	Feeding cost/day/cow	.958**	.078*	1
25.1–30 kg	Body weight	1	.040	.965**
	Milk production	.040	1	.034
	Feeding cost/day/cow	.965**	.034	1
>30 kg	Body weight	1	.063	.802**
	Milk production	.063	1	.577**
	Feeding cost/day/cow	.802**	.577**	1

** P<1%,* P<5%

Table 3. Distribution of body weight and feeding cost (€)

Groups of milk production	N	Body weight				Feeding cost/day/cow			
		Mean	Std. Deviation	Minimum	Maximum	Mean	Std. Deviation	Minimum	Maximum
14–20 kg	645	589.38abc	85.84	400	860	1.90a	0.19	1.50	2.52
20.1–25 kg	658	582.91b	80.21	400	880	3.20b	0.32	2.67	3.87
25.1–30 kg	608	593.26c	72.36	400	880	3.54c	0.30	2.93	4.10
>30 kg	661	615.07d	67.55	400	810	4.36d	0.36	3.43	5.58

The means with the same letter are not significantly different (P<5%)

profit is an environmental and feeding issue. Our results suggest that most of the mid-sized hungarian dairy farms work with slightly heavier cows than cost effectivness considers. The daily practice of the last decades has selected cows to 550–650 kg. This weight is optimal to produce 25 kg of milk in avarage. However this weight range has wide deviation and most of the dairy livestock is very heterogeneous. We have proved that there is a strong regression (R^2=0.64–0.93) in every groups with weight and forage costs. Every 50 kg of body weight results 0.005–0.215 €cents growth in forage finances.

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