

## Lifetime performance and longevity traits in Slovak Spotted dairy cows in dependence on feeding system

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The objective of this study was to analyse eight milk yield and longevity traits in dependence on feeding (grazing) system. Data of purebred Slovak Spotted dairy cows (35,812 heads) culled in the period between 2006 and 2019 were evaluated. Only herds those feeding (grazing) system was known were taken into account. Dairy cows were assigned to four groups: (1) heifers not grazed, cows not grazed (17,628 heads), (2) heifers grazed, cows not grazed (13,056 heads), (3) heifers not grazed, cows grazed (156 heads) and (4) heifers grazed, cows grazed (4,972 heads). The highest average 305-day milk yield (6,139.22 kg) and lifetime milk yield (18,606.78 kg) were found in animals of group (1). Contrariwise, longevity traits were found more favourable in animals of group (4). Their productive life was by 102.78 days longer and average parity was by 0.14 higher in comparison to group (1). The differences between groups were found significant.

**Keywords:** milk yield, longevity, grazing, heifers, cows, Slovak Spotted cattle

### 1 Introduction

Milk yield of Slovak Spotted dairy cows has been increasing in recent years (Bujko et al., 2020). In addition to average 305-day milk yield, lifetime milk yield and longevity traits are of the highest economic importance. Strapák et al. (2010), who analysed data of 118,646 Slovak Spotted cows culled in the period between 1995 and 2005, reported length of productive life equal to 1,451 days. Čanji et al. (2008), who analysed milk yield and longevity traits in cows of the same breed, reported shorter productive life (1,411 days) and average parity equal to 3.8 and 3.9, respectively. Ludovic et al. (2017) reported age at first calving equal to 997.12 days, age at culling equal to 2,762.8 days, length of productive life equal to 1,765.68 days and 305-day milk yield equal to 5,252.1 kg in Fleckvieh dairy cows in Romania. Petrovic et al. (2009), who analysed population of Fleckvieh cows in Slovenia, reported age at first calving equal to 924.16 days, length of productive life equal to 1317 days, lifetime milk yield equal to 17,169 kg, 305-day milk yield equal to 5,719.05 kg, milk yield per productive day equal to 7.66 kg. According to Strapák et al. (2008), herd is one of important factors influencing variability of length of productive life. Although these authors did not involved effect of pasture in their analysis directly, it appears that is part of factor herd. Similarly to aim of the current study, effect of pasture on lifetime performance and longevity traits were the object of interest in study of Fuerst-Waltl et al. (2019) who analysed data of 871,287 Fleckvieh cows. According to these authors, cows that were grazed as heifers had length of productive life by 60 days longer and risk of culling by 15% lower than cows that were not grazed as heifers. Kragmeier et al. (2015), who analysed data of 8,541 Simmental dairy cows from Alps region, reported that cows that were grazed as heifers had productive life by 92 days longer and lifetime milk yield by 13.6% higher than cows that were not grazed as heifers.

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## 2 Material and methods

Data of 35,812 purebred Slovak Spotted dairy cows, that were culled in the period between 2006 and 2019, were provided by the Breeding Services of SR (routine performance testing). Eight milk yield and longevity traits were analysed. Only herds those feeding (grazing) system was known were taken into account. Cows were assigned to four groups: (1) heifers not grazed, cows not grazed, (2) heifers grazed, cows not grazed, (3) heifers not grazed, cows grazed and (4) heifers grazed, cows grazed. Analysis of variances (effect of grazing system involved as fixed factor), General Linear Model as implemented in SAS (2009), was applied. Scheffe's multiple range test were used to assess significance of differences ( $P < 0.05$ ) between respective groups.

## 3 Results and discussion

The most numerous group (1) i.e. heifers not grazed, cows not grazed accounted for 17,628 heads. The group (4) i.e. heifers grazed, cows grazed accounted for 4,972 heads. The group (2) i.e. cows grazed as heifers, but not grazed when become cows accounted for 13,056 heads. The least numerous group (3) i.e. cows not grazed, but heifers grazed accounted for 156 heads. Basic statistics (means) of studied traits, regardless of feeding (grazing) system, is given in Table 1. Age at first calving (30.48 months) was almost the same as value found in Slovenian Fleckvieh cows by Petrovic et al., (2009) and lower than value found in Romanian Fleckvieh cows (32.8 months) by Ludovic et al. (2017). When comparing with literature values (see Introduction), length of productive life equal to 1,199.86 days in the current study was the lowest. Moreover, average parity (3.24) was lower than Čanji et al. (2008) found in Slovak Spotted cows previously. Taking into account results from performance testing and own analyses, shortening of productive life in Slovak Spotted cows was mainly the result of management decisions. The export of heifers is decreasing in recent years and heifer surpluses are diminishing through the following measures: heifers are intended to be included in breeding as early as possible and old cows are intended to be culled as early as possible (often while able to produce). The further reason could result from fact that number of cows bred in intensive system is increasing and breeders have to cope with need to intensifying cow productivity. Average 305-day milk yield equal to 5,719.05 kg in the current study was higher than in Romanian Fleckvieh cows, as reported by Ludovic et al. (2017). Lifetime milk yield equal to 17,583 kg in the current study was higher than in Slovenian Fleckvieh cows (17,169 kg), as reported by Petrovic et al. (2009). Milk yield per productive day equal to 7.34 kg in the current study was lower than in Slovenian Fleckvieh cows (7.66 kg). The effect of grazing system, tested using  $F$ -value, was significant ( $P < 0.05$ ). The differences between respective groups, tested using Scheffe's multiple range tests, were also significant ( $P < 0.05$ ). The highest average 305-day and lifetime milk yields (6,139.22 and 18,606.78 kg) were found in group (1) i.e. in heifers not grazed, cows not grazed. Contrariwise, these traits were the lowest in group (4) i.e. in heifers grazed, cows grazed (4,468.81 and 13,170.45 kg). The highest milk yield per productive day (7.97 kg) was found in group (1). The lowest milk yield per day of life (5.36 kg) was found in group (3) i.e. in heifers not grazed, cows grazed. In group (2) with only heifers grazed, less favourable milk traits were found in comparison to group (1). These findings did not agree with study of Krogmeier et al. (2015), however, they analysed cows that produced in Alps region. The most favourable longevity traits were found in group (4) i.e. in heifers grazed, cows grazed. Length of productive life was 1,267.61 days; i.e. by 102.78 days longer than in group (1). Regarding average parity, the highest value (3.32) was found in group (4) and the lowest value (3.18) found in group (1). These findings agreed with studies of Fuerst-Waltl et al. (2019) and Krogmeier et al. (2015). The dependence of length of productive life and of age at first calving on grazing system is given in Figure 1 (least numerous group not included).

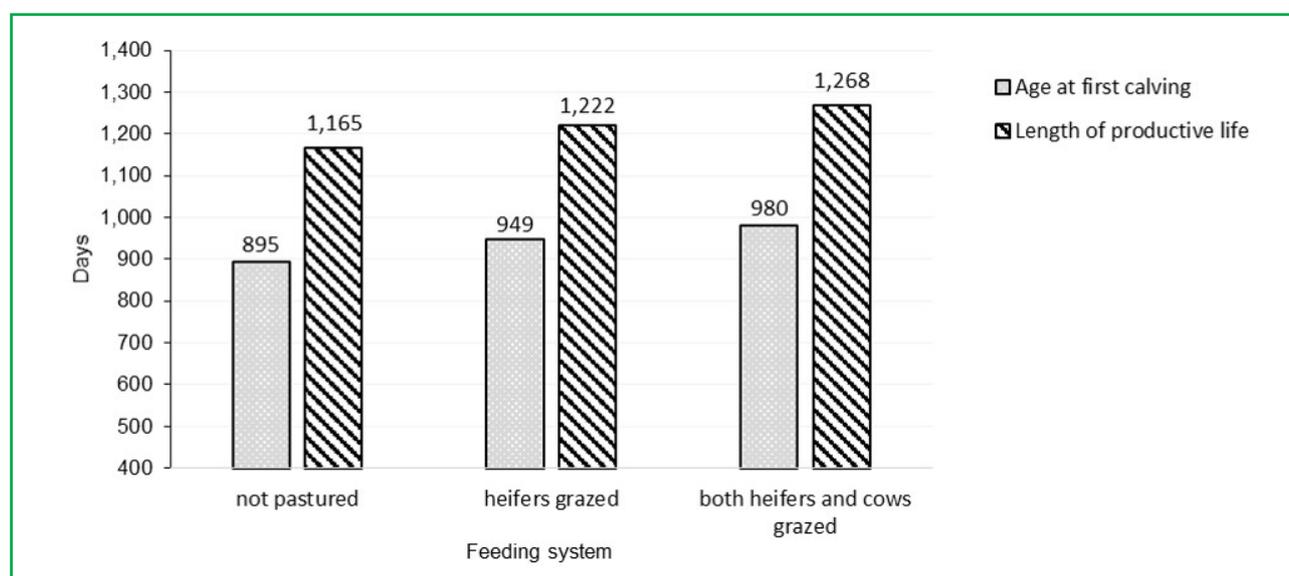
**Table 1** Mean values of analysed traits

Trait	Mean
Age at first calving (days)	926.68
Length of productive life (days)	1,199.86
Age at culling (days)	2,126.54
Average parity	3.24
Lifetime milk yield (kg)	17,583
305-day milk yield (kg)	5,719.05
Milk yield per day of life (kg)	7.34
Milk yield per day in milk (kg)	14.37

**Table 2** Means and mean standard errors of studied traits by feeding (grazing) system

	(1) Not grazed (n = 17,628)	(2) Heifers grazed (n = 13 056)	(3) Cows grazed (n = 156)	(4) Grazed (n = 4,972)
Age at first calving (d)	894.93 ±0.96	948.89 ±1.12	952.69 ±10.21	980.10 ±1.81
Length of productive life (d)	1,164.83 ±6.24	1,221.63 ±7.24	1,175.81 ±66.30	1,267.61 ±11.74
Age at culling (d)	2,059.77 ±6.35	2,170.52 ±7.37	2,128.50 ±67.45	2,247.72 ±11.95
Average parity	3.18 ±0.02	3.29 ±0.02	3.26 ±0.16	3.32 ±0.03
Lifetime milk yield (kg)	18,606.78 ±100.63	17,464.29 ±116.94	13,170.45 ±1070.07	14,389.66 ±189.85
305-day milk yield (kg)	6,139.22 ±11.93	5,568.23 ±13.84	4,468.81 ±131.14	4,619.85 ±22.91
Milk yield per day of life (kg)	7.97 ±0.03	7.13 ±0.03	5.36 ±0.31	5.67 ±0.05
Milk yield per day in lactation (kg)	15.66 ±0.04	13.86 ±0.05	10.77 ±0.43	11.22 ±0.08

d – days



**Figure 1** Age at first calving and length of productive life by feeding (grazing) system

#### 4 Conclusions

The findings indicate that cows that were grazed had more favourable longevity traits (longer productive life, higher average parity) and less favorable milk yield traits (average 305-day milk yield, lifetime milk yield, milk yield per day of life) in comparison to cows that were not grazed. It may be presumed that system with cows on pasture is of lower economic effectiveness and may be a reason why number of cows on pasture is decreasing in Slovakia. Having in mind better quality of milk produced by cows on pasture and taking into account its positive influence on human diet, financial support for this system is needed. The favourable influence of grazing on cow wellbeing is not negligible and should be taken into account.

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