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ORIGINAL ARTICLE

Reasons for the culling of dairy cows on low-input mountain farms

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Abstract
Reasons for the culling of dairy cows were scrutinized on thirty-four low-input farms in the Šumava mountains in the Czech Republic. An increase in the frequency of the most common culling category – category 58 (other health reasons) – was identified in both the Holstein and Czech Fleckvieh breeds between 2000 and 2007: from 35% to 59% in the Holstein cows and from 19% to 41% in the Czech Fleckvieh cows (χ^2 test; $P<0.001$). This brought the Czech Fleckvieh cows to the same level of frequency as in the Czech Republic population, while the frequency among Holstein cows was on average 11% higher than in the Czech Republic population. The frequency of category 58 was higher in the Holstein than in the Czech Fleckvieh cows, but category 52 (low milk production) was more frequent in the Czech Fleckvieh than in the Holstein cows ($P<0.001$). There is a link between category 58 'other health reasons' and an increase in the milk productivity of the cows; this results eventually in a higher incidence of metabolic disorders and is discussed in this paper.

Key words: reasons for culling; Holstein; Czech Fleckvieh; low-input farm

INTRODUCTION

About 60% of dairy cows are currently reared in the mountain areas in the Czech Republic (Kvapilík et al. 2009). The mountain farms generally rely on a low-input management strategy based on the effective utilization of permanent grasslands (Kohoutek et al. 2009). The good health status of cows and their reproductive performance are among the most important factors determining the rentability of farms in these areas (Frelich et al. 2008); other factors are: the environmental conditions – altitude and air temperature (Brouček et al. 2006, 2007, 2009, Frelich et al. 2009, Koukolová et al. 2009); the technology of housing, feeding and milking, and the level of hygiene in stalls (Cempírková 2006, 2007, Cempírková and Mikulová 2009, Cempírková et al. 2009). The general health status of a herd can be evaluated from data collected on the reasons given for the culling of cows. These are sorted into several zootechnical and health categories

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and recorded by the breeding associations in the context of breed value monitoring. The aim of this study was to examine the longterm changes in the health status of cows reared on low-input dairy farms using this data on the reasons for culling.

MATERIAL AND METHODS

Thirty-four herds located at altitudes ranging from 414 to 896 m above sea level in the Šumava mountains in the Czech Republic ('Šumava population') were selected for scrutiny. Data recorded by the Czech-Moravian Breeders Corporation in the context of breeding value surveys on Holstein and Czech Fleckvieh cows were used in this study. The Holstein breed refers to cows with a 50–100% deal of H-breed or R-breed (breeding groups of H1–4). The Czech Fleckvieh refers to cows with a 51–100% deal of C-breed (breeding groups of C1–2). Data on reasons for culling and the milk performance of Czech Republic population were adapted from the yearbooks on the results of breeding-value surveys published by the Czech-Moravian Breeders Corporation in the control years 2001/2002, 2002/2003, 2004/2005, 2005/2006, 2006/2007, 2007/2008.

The reasons for culling in the Šumava population were analysed using data from 8,124 Holstein and 5,194 Czech Fleckvieh culled cows calving from 2000 to 2007. Only cows culled for zootechnical and health reasons were included in the study. Zootechnical reasons comprised (low) milk production (category 52), high age (category 53) and other zootechnical reasons (category 54); health reasons comprised mastitis (category 55), fertility (category 56), heavy birth (category 57) and other health reasons (58).

The frequencies of particular reasons for culling were compared using the χ^2 test (StatSoft CR s r. o. 2008). The culled cows were sorted according to the breed (Holstein, Czech Fleckvieh), population (Šumava, Czech Republic), number of lactations at time of culling (Parity-1: 1st lactations, Parity-2: 2nd lactations, Parity-3: 3rd, 4th, 5th lactations, Parity-4: 6th and later lactations) and according to the year (period 2000–03 or 2004–07). In the Šumava population, this referred to the range of years of the last calving of the culled cows (2000–2003 or 2004–2007). In the Czech Republic population this referred to the range of years when the cows were culled, i.e. 2001–2003 (refers to period 2000–03 below in the text) and 2004–2008 (refers to period 2004–07 below in the text).

RESULTS

The distribution of reasons for culling in the years 2000–2007 is given in Fig. 1 and 2. The differences between 2000–03 and 2004–07 were significant ($P<0.001$) in both breeds. The frequency of category 58 (other health reasons) gradually rose between 2000 and 2007 in both breeds. In the Holstein, it increased from 35% in 2000 to 59% in 2006 (by 24%). In the Czech Fleckvieh, it increased from 19% to 41% (by 22%) in the same period. In the Holstein this was accompanied by a decrease in categories 55 (mastitis), 56 (fertility) and 57 (heavy birth). In the Czech Fleckvieh, it was accompanied by a decrease in category 54 (other zootechnical reasons) and 56 (fertility).

A comparison between the Šumava and the Czech Republic populations is given in Fig. 3 and 4. The increase in the frequency of category 58 (other health reasons) was 11% higher in Holstein cows in the Šumava population compared to the Holstein cows in the Czech Republic population. In the Czech Fleckvieh, the frequency of category 58 increased from a value 10% lower than in the Czech population in 2000–03 to the same frequency in 2004–07 (35%). Simultaneously, the frequency of category 52 (milk production) increased by 8%, while category 56 (fertility) decreased by 6% against the Czech Fleckvieh cows in the Czech Republic population.

The distribution of culling reasons differed significantly between the Holstein and the Czech Fleckvieh breed, both in the Šumava and in the Czech Republic populations ($P<0.001$; Figs 5, 6). The frequency of category 58 (other health reasons) was higher in the Holstein than in the Czech Fleckvieh cows, whereas category 52 (milk production) was more frequent in the Czech Fleckvieh than in the Holstein cows. These differences were more pronounced in the Šumava population (Fig. 5) than in the Czech Republic population (Fig. 6). In category 58, the difference between the two breeds was 17% and 19% (in 2000–03 and 2004–07, respectively) in the Šumava population and 11% and 8% (in 2000–03 and 2004–07, respectively) in the Czech Republic population. In category 52, the difference between the two breeds was 12% and 18% (in 2000–03 and 2004–07, respectively) in the Šumava population and 9% and 8% (in 2000–03 and 2004–07, respectively) in the Czech Republic population.

A comparison of culling reasons between the different categories of parity is given in Fig. 7 and 8. In both breeds the frequency of category 58 (other health reasons) rose gradually with the

number of the lactation, i.e. from Parity-1 category (1st lactations) over Parity-2 (2nd lactations) to Parity-3 category (3rd, 4th, 5th lactations). Category 58 was the most frequent reason for culling in all the parity categories in both the breeds. In the Holstein, this culling reason was more common than in the Czech Fleckvieh, where category 52 (milk production) and category 56 (fertility) were similarly frequent, mainly in Parity-1 and Parity-2 categories.

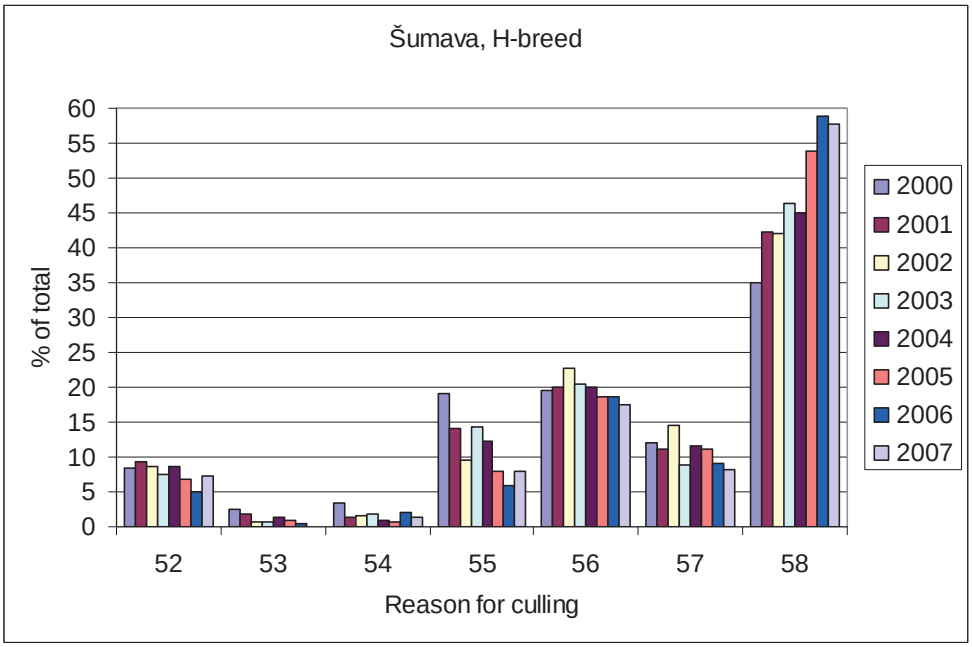

Fig. 1. The distribution of reasons for culling by Holstein cows in thirty-four examined herds in 2000–2007 (for explanation of 52–58 symbols see Material and Methods)

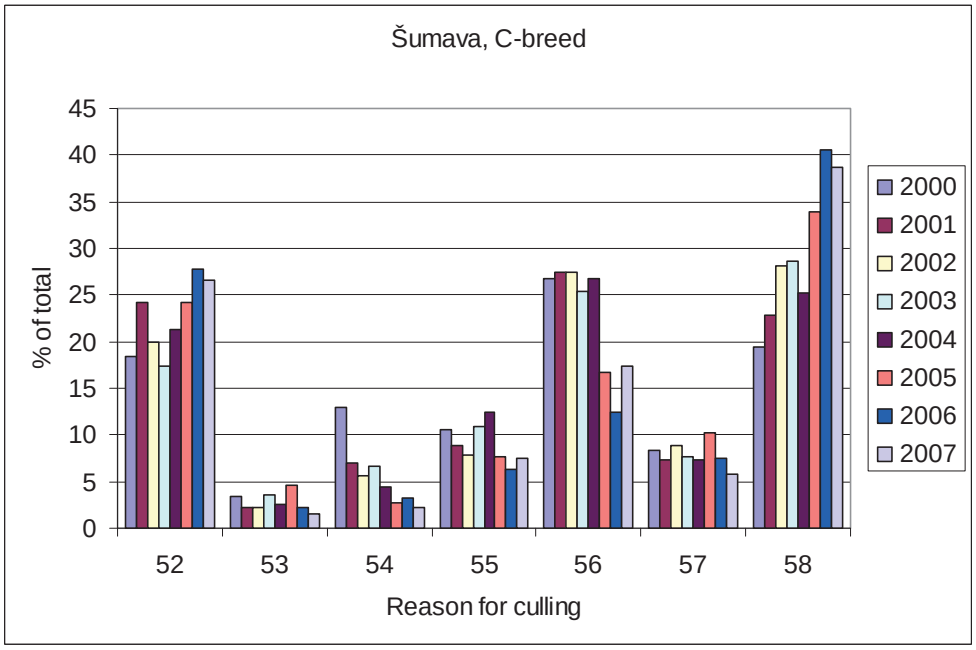

Fig. 2. The distribution of reasons for culling by Czech Fleckvieh cows in thirty-four examined herds in 2000–2007 (for explanation of 52–58 symbols see Material and Methods)

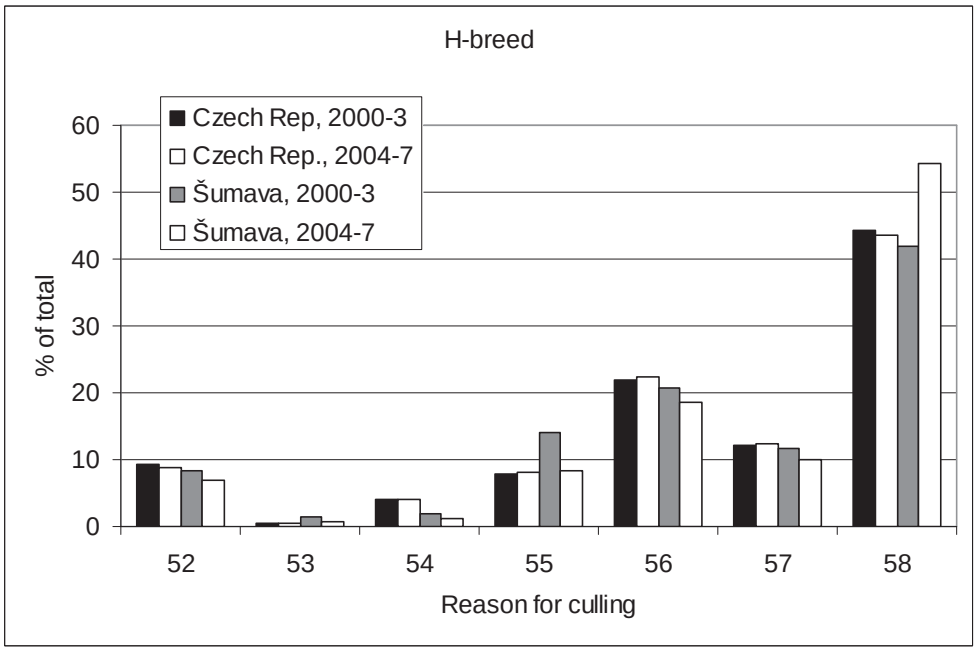

Fig. 3. The distribution of reasons for culling by Holstein cows in thirty-four examined herds and in Czech Republic population in 2000–2003 and 2004–2007 periods (for explanation of 52–58 symbols see Material and Methods)

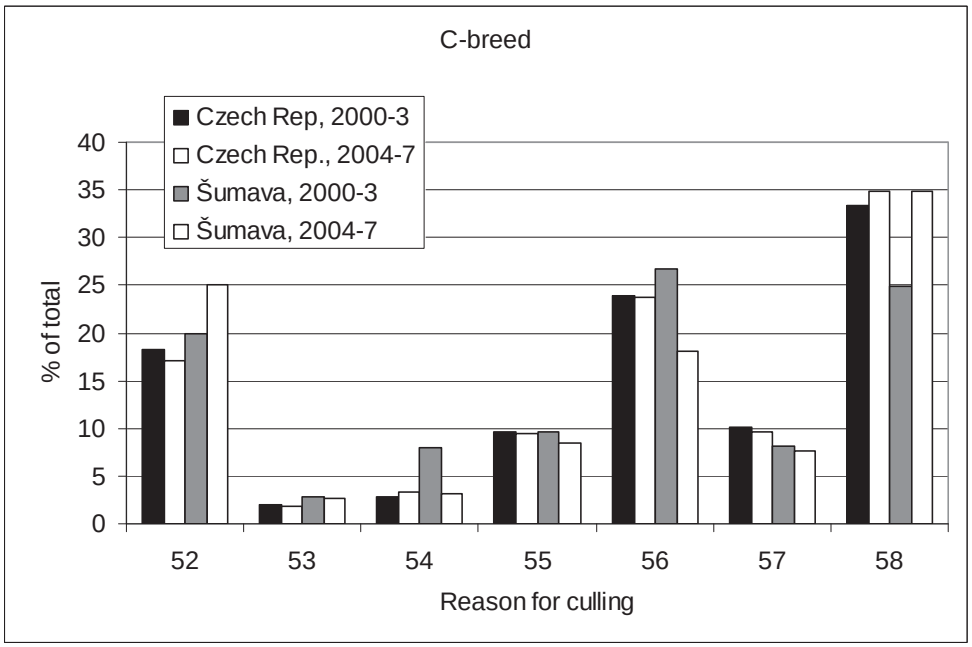

Fig. 4. The distribution of reasons for culling by Czech Fleckvieh cows in thirty-four examined herds and in Czech Republic population in 2000–2003 and 2004–2007 periods (for explanation of 52–58 symbols see Material and Methods)

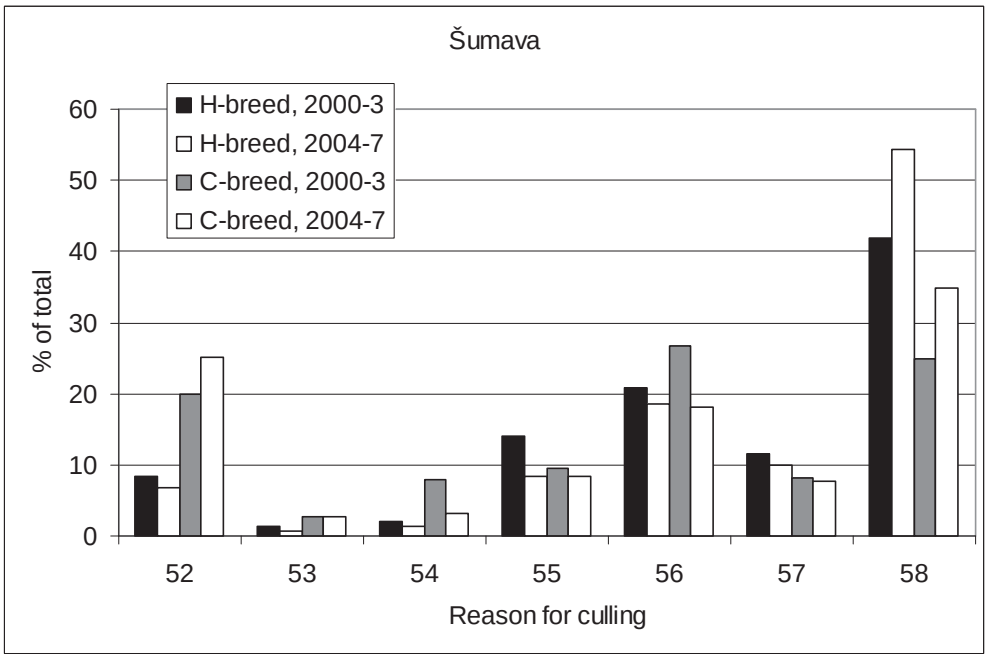

Fig. 5. The distribution of reasons for culling by Holstein and by Czech Fleckvieh cows in thirty-four examined herds in 2000–2003 and 2004–2007 periods (for explanation of 52–58 symbols see Material and Methods)

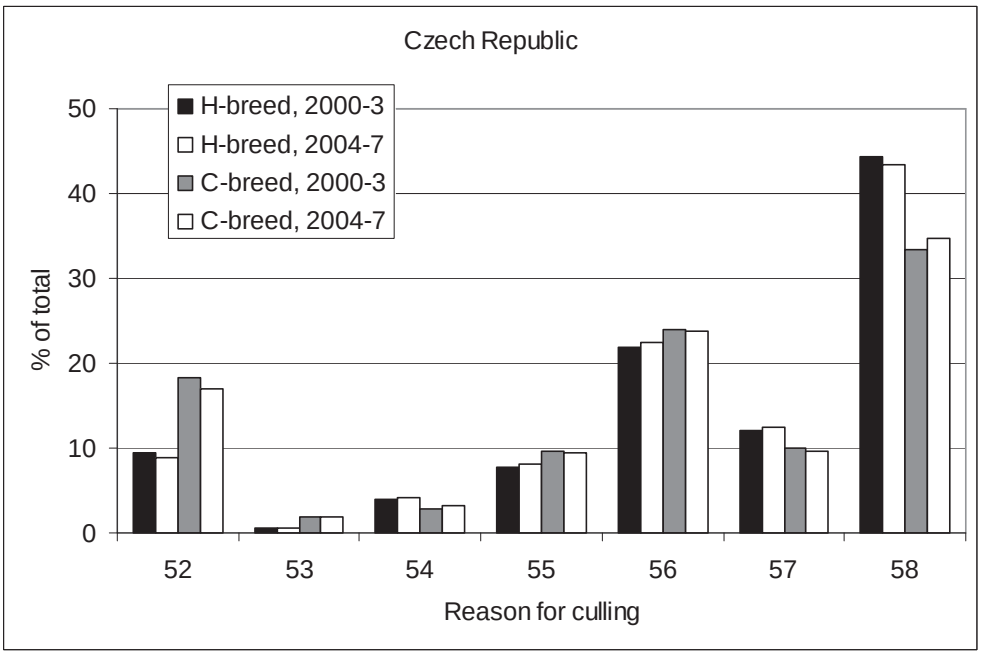

Fig. 6. The distribution of reasons for culling by Holstein and by Czech Fleckvieh cows in Czech Republic population in 2000–2003 and 2004–2007 periods (for explanation of 52–58 symbols see Material and Methods)

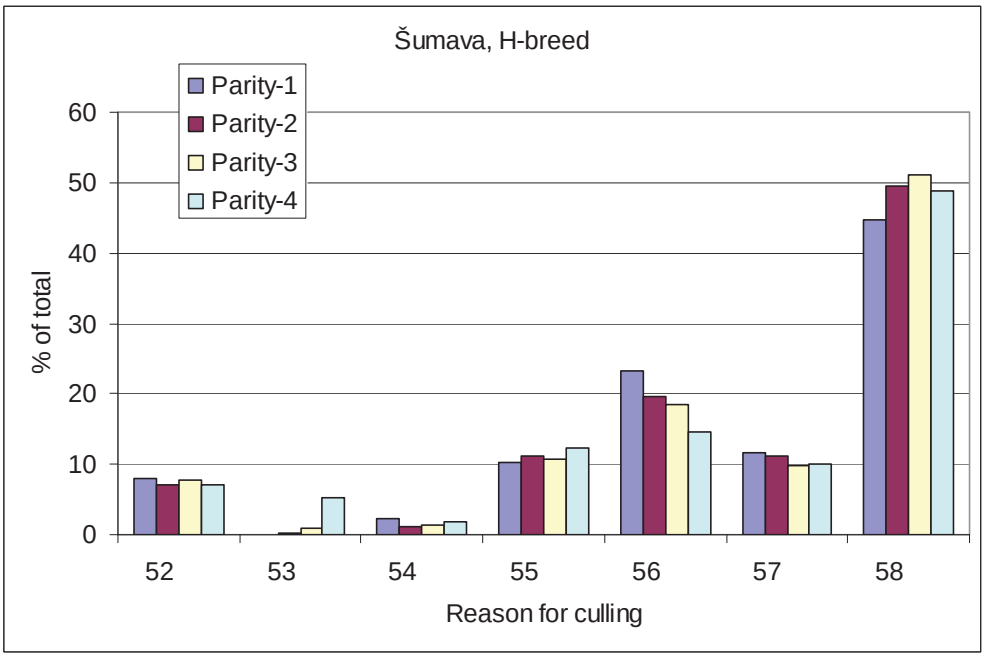

Fig. 7. The distribution of reasons for culling by Holstein cows in thirty-four examined herds in four parity categories (for explanation of 52–58 symbols and Parity 1–4 categories see Material and Methods)

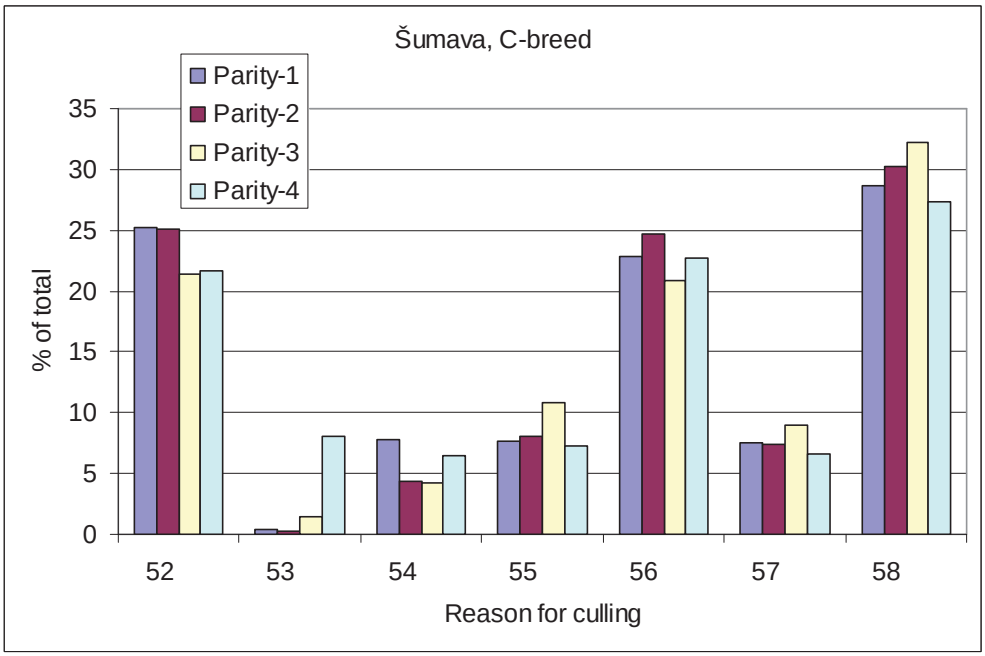

Fig. 8. The distribution of reasons for culling by Czech Fleckvieh cows in thirty-four examined herds in four parity categories (for explanation of 52–58 symbols and Parity 1–4 categories see Material and Methods)

DISCUSSION

Significant changes in the frequency of particular culling reasons were identified in the thirty-four examined herds between 2000 and 2007. The frequency of category 58 (other health reasons) increased in proportion to the other reasons in both breeds. In the Czech Fleckvieh, this reason for culling became as frequent as in the Czech Republic population in the 2004–2007 period, while in the Holstein, this category was 11% more frequent compared to the Czech Republic population. The differences in reasons for culling between the two breeds were similar in both the Šumava and Czech Republic populations. Holstein cows were culled more frequently for 'other health reasons' (category 58) than Czech Fleckvieh cows, whereas Czech Fleckvieh cows were culled more frequently because of low milk production (category 52) than Holstein cows. The frequency of particular reasons was similar in cows with different numbers of lactations. The culling category 58 (other health reasons) was more frequent in later lactations, however, than in cows in the 1st or 2nd lactation.

An increased frequency of cullings for 'other health reasons' (category 58) may be attributed to higher physiological stress and to a higher incidence of metabolic disorders resulting from the increase in cow milk productivity between 2000 and 2007. The milk yields increased by an average of 986 kg per lactation in Holstein cows and by an average of 948 kg per lactation in the Czech Fleckvieh cows in the examined herds between 2000 and 2007 (Frelich et al. 2010, in prep.). Such increases in milk productivity are said to be connected with a higher incidence of metabolic disorders, lower production life and a worse reproductive performance (Etherington et al. 1996, Moore and Thatcher 2006). This may explain also the higher frequency of 'other health reasons' (category 58) recorded in the Holstein breed with a higher milk production than the Czech Fleckvieh. The inability of cows to cope with the demands of high production results in a higher susceptibility to infectious disease and to the disorders associated with a negative calcium and energy balance like milk fever and ketosis (Goff 2006).

These longterm effects are revealed also in the increase of replacement in the herds examined. The mean number of lactations decreased from 2.6 to 2.4 between 2003 and 2007 (Frelich et al. 2010, in prep.). This follows a general trend in the Czech Republic population, where the mean number of lactations decreased from 2.8 to 2.7 in the same period (Kvapilík et al. 2009). The increased replacement of cows is reflected also in the high proportion of compulsorily slaughtered cows in the Czech Republic (24.7% in 2007), which has a negative impact on the economy of livestock breeding.

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