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THE EFFECT OF THE DIFFERENT HOUSING SYSTEMS ON THE SECONDARY BREEDING CHARACTERISTICS (LIFETIME, LIFETIME PRODUCTION) AND ON THE CULLINGS

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2002

1. BACKGROUND AND AIMS OF THE STUDY

In order to improve the profitability of milk production we need to increase the production itself and use more effective technology. On dairy farms we have two ways to do it: either of them is the biological way, with genetical - selection - work; while the other is the mechanical way-making the environmental factors as favourable as possible. The question is which way results in optimal production in terms of the unity of animals and their environment.

It is a fact that the biological requirements of the animals cannot be satisfied perfectly, because technology development is a question of compromise. However, it is important to find the right way, because accommodation is an energy consuming process, consequently the efficiency of energy transformation depends on it KOVÁCS, (1980), CZAKÓ and SÁNTHA, (1984). We need to look for the genotypes which are able to produce optimally under modern conditions CZAKÓ, (1976), and for the technological solutions which are more suitable for satisfying the requirements of the animals.

The aims of this study were to:

- investigate the lifetime production and lifetime traits of different genotypes of Hungarian Spotted Cattle x Holstein Friesian cross-breeds in different housing systems in consideration of:
  - the number of closed lactations and milking days,
  - the milk and fat yield, fat content,
  - the milk yield per a milking day,
  - the period from the calving to culling.

- examining the causes and distribution of culling and the lifetime performance of culled cows in different housing systems.
- analaysing the effect of the housing system on the reproductive traits, like:
  - length of service period
  - fertility index

- Furthermore, studying, beside the housing system, what effect has the year (age group), and the genotype on the secondary (lifetime and lifetime production) traits.

2. MATERIAL AND METHODS

2.1. The scene and time of research

The secondary breeding characteristics of the Hungarian Spotted cattle x Holstein Friesian cross breeds were investigated on 10 dairy farms with tie-up system, 6 dairy farms, which changed their housing system from tie-up to loose housing system, and 6 dairy farms with loose housing system. In the examination there were involved the data of those cows, which started their first lactation, produced and were culled also between 1975-1999. It means that the records of investigated cows will not change any more.

The survey was finished in 1999.

The next genotypes were examined:

- Hungarian Spotted(HS) x Holstein Friesian(HF) F_1: (50%HS-50%HF), R_1: (25%HS-75% HF), R_2: (12.5%HS-87.5% HF), R_3: (6.25%HS-93.75% HF), R_4: (3.125%HS-96.875% HF),
- Holstein Friesian(HF) (100% HF)

2.2. Breeding characteristic tested:

2.2.1. Lifetime production traits

Number of lactations, days of milking, milk yield, fat contant, fat yield, milk yield per milking days.

2.2.2. Lifetime

The period from the calving to culling (years)

2.2.3. Causes of culling, removing the cows from the herd

- Death (code 1), emergency slaughtering (code 2), selling (code 3).
- Culling because of reproductive problems (code 35), low milk production (code 28), sterility (code 23), udder disorders (code 32), others (code 29).

2.2.4. Fertility traits

- Length of service period (days),
- fertility index

2.2.5. The effect of the year, age group

The effects of the years, and the genotypes were examined in the finishing part of the study. Despite of the great number of database there were involved just data of cows borned between 1986 and 1990 by that investigation, to have the acceptable number of records for each genotype for the statistically evalution of compairing.

I used the MATE biometrics and the STATISTICA program package for the statistical evaluations.

3. RESULTS

According to the examination of lifetime performance:

The F_1 genotype finished the most average lactations in the loose-housing system (3.68), followed by the redone (transformed) system with 3.58 lactations, and in the tie-up system finished 3.29 lactations. In the loose housing system the cows produced 0.1 lactation more compared to the redone system, and 0.29 lactations more compared to the tie-up system.

The tendency of milking days is in contradiction with the number of lactation. The least number of milking days (1065 days) is in the loose housing system, and the most (1244 days) is in the tie-up system. In the tie-up system the cows produced 185 days longer than in the redone system, and 179 days longer than in the loose housing system.

The cows had the best lifetime production in the tie-up system (20134 kg), followed by the cows kept in the loose housing system (18827 kg), and the worst result was in the redone system (17275 kg). The lifetime production of cows in the tie-up system is better with 2859 kg than in the redone system, and better with 1307 kg than in the loose housing system.

In this genotype the cows kept in the tie-up system had highest fat percentage (3.78%), and the lowest (3.52%) in the loose housing system. The fat percentage is better with 0.26% in the tie-up system compared with the tie-up system.

Cows kept in the loose housing system had the highest milk yield performance per milking day (16.69 kg). By the tie-up system it was 15.17 kg and in the redone system 15.44 kg. This high producing level can not be obtained for a long time, so the lifetime performance is lower in the loose housing system. The milk yield per milking day

is better with 1.41 kg in the loose housing system, than in the tie-up system, and it is better with 0.12 kg compared with the redone system.

The differences in the lifetime production traits are highly significant between the tie up and redone housing system and between the tie-up and loose housing system. But, between the redone and the loose housing system, highly significant differences there are just by the traits of milk kg and daily milk kg.

The R_1 genotypes under an average 3.05 lactations produced the longest milking day (1276 day), the highest lifetime performance (21741 kg) and the highest fat percentage (3.66%) in the tie-up system, but the performance of milk yield per milking day was the lowest (16.23 kg). There is an opposite tendency in the case of cows kept in loose housing system. The milk yield per milking day is the highest (17.64 kg), the number of milking day is the fewest (966 day), and the lifetime production is fewer (18041 kg), and the fat percentage also is the fewest (3.52%). The tendency is similar in the redone housing system. Cows kept in tie-up system produced 3964 kg more lifetime production as compared to the redone system, and 3700 kg more as compared to the cows kept in the loose housing system.

According to the difference in lifetime performance traits between the tie-up and redone system it can be established that the differences are highly significant (p=0.1%), except in case the number of lactation, where there is no significant difference. Between the tie-up and loose housing system in every lifetime performance traits there are highly significant differences, whereas between the redone and loose housing system highly significant difference there is just only in the number of lactations.

The R_2 genotypes can accomplish more lactations in the loose housing system (2.93) than in the redone system (2.85) and in the tie

up system (2.83). Although these differences are minimal, the milking day is still higher in the tie-up system (1137 days). The lifetime production (20071 kg) and the fat content (3.65%) are also better in the tie-up system. In the redone system the number of milking day is 935, the lifetime milk production is 17156 kg, the fat percentage is 3.52%. The results in the loose housing system are the weakest, the number of milking day is 863 day, the lifetime milk production is 16824 kg and the fat content is 3.58%. The milk yield per milking day of the cows kept in the loose housing system is better (18.25 kg) than in the case of the cows kept in the tie-up system (16.8 kg), but the highest results are in the redone system (18.46 kg).

The lifetime milk yield is higher with 2924 kg in the tie-up system than in the redone system and is higher with 3246 kg than in the loose housing system.

The differences between the tie-up and the redone system, and between the tie-up and loose housing system are significant at a level p=0.1% except the number of lactations, between the redone and the loose housing system just in milking day and milk yield per milking day are significant differences.

In the case of the R_3 genotypes the number of lactation is the highest in the loose housing system (2.70), in the tie up system is 2.55 and in the redone system is 2.53. The differences between the redone and loose housing system are significant at a level p=1%, between the tie-up and loose housing system are significant at a level p=5%, but there are no significant differences between the tie-up and loose housing system.

The number of milking day is the highest in the tie-up system (901 day), in the redone system is 820 day and in the loose housing system is 784 day. The differences between the tie-up and loose housing system are significant at a level p=0.1%, between the tie-up

and redone system are significant at a level p=1% and between the redone and loose housing system are significant at a level p=10%.

The lifetime production is also higher in the tie-up system (16568 kg) than in the redone system (15645 kg) and in the loose housing system (14594 kg). The lifetime milk production is higher with 1974 kg in the tie-up system compare with the loose housing system and compare with the redone system is higher only with 923kg. The difference between the tie-up system and loose housing system is significant at a level p=0.1%, between the redone and loose housing system is significant at a level p=1% and between the tie-up and redone system there is significant difference at a level p=10%.

The fat content is the highest (3.70%) in the loose housing system, that follow the cows kept in the tie-up system (3.63%), the fat percentage in the redone system is 3.56%.

The cows kept in the redone system have the highest milk yields per milking day (19.32 kg), in the loose housing system the daily milk yield is 17.59 kg, in the tie-up system it is 17.47 kg. The difference between the redone and tie-up system and between the redone and loose housing system is highly significant.

In case of R_4 genotype the number of lactation is the highest in the redone system (2.29), there are no difference between the tie-up and loose housing system (2.23-2.22).

The milking day is the longest in the tie-up system (760 days), in the redone system is 702 nap, and is the shortest in the loose housing system. (631 days). The lifetime production is the highest in the tie-up system (13977 kg), in the redone system is 13796 kg and in the loose housing system is 11369 kg. The lifetime milk yield is higher with 2608 kg in the tie-up system than in the loose housing system, and is higher with 181 kg than in the redone system. The differences between the tie-up and loose housing system and between

the redone and loose housing system are significant at a level p=0.1%, but between the tie-up and redone system are not significant.

There are no big differences between the three housing system in fat percentage.(3.56-3.70). The fat percentage is the highest in the loose housing system and the lowest in the tie up system.

The milk yield per milking day is 19.56 kg in the redone system, is 17.54 kg in the tie- up system and is 17.02 kg in the loose housing system. The differences between the tie-up and redone system and between the redone and loose housing system are highly significant, but the difference between the tie-up system and loose housing system is significant only at a level p=5%.

By the cows of purebred Holstein Friesian there are no differences in the number of lactations between the three housing system.

The cows kept in the redone system produce the longest time 1639 days. The milking days in the tie-up system is 1076 days, in the loose housing system is 820 days. All the differences in milking days are highly significant

The milk yield per milking day is the highest in the loose housing system (18.54 kg). In the tie-up system it is 15.30 kg and the weakest result is in the redone system (14.71 kg).

The difference is significant between the redone and loose housing system and between the tie-up and loose housing system (p=0.1%). Between the tie-up and redone system there are no significant differences.

Although the Holstein Friesian cows kept in the loose housing system produced the highest milk yield per milking day, but the number of milking day was the fewest, so the lifetime milk yield was also the lowest (15345 kg). Cows in the redone system had the

weakest milk yield per milking days, but their lifetime production was higher (23753 kg), because they could produce it for a long time. The lifetime milk in the redone system is higher with 8408 kg compared with the loose housing system and is higher with 6245 kg compared with the tie-up system. The differences between the tie-up and the redone system and between the redone and loose housing system are significant at a level p=0.1%.

According to the examination of lifetime traits:

In the case of F_1 genotypes the best lifetime traits are in the loose housing system. In this housing system the cows live in average 5.9 years, in the redone system 5.5 years and in the tie-up system 5.4 years. The difference between the tie-up and redone system (52 days) is significant at a level p=1%. The difference between the redone and loose housing system (121 days) is significant at a level p=0.1%. The considerable difference (173 days) between the tie-up and loose housing system is significant at a level p=0.1%.

The cows of R_1 genotypes lived the longest period in the loose housing system (5.4 years), while in the redone and tie stalls they lived 5.1 and 5.2 years, respectively. The difference in lifetime (114 days) between the redone and loose housing system is significant at a level of p=0.1%. There is a similarly strong significant difference (97days) between the bounded and unbounded system.

By the R_2 genotype, the cows had the longest lifetime also in the loose housing system (5.1 years). The average lifetime in the transformed stalls was 5 years, while in the tie stall it was 4.9 years. The 34 days difference between the transformed and loose housing system and the 46 days difference between the bounded and unbounded system is slightly significant at a p=5% level.

In case of R_3 genotype the cows lived longest period also in the loose housing system (4.8 years), while in the transformed and tie stalls they lived 4.7 years, 4.5 years, respectively. The difference is significant at a p=1% level between the tie and transformed stalls (74 days), and at a p=0.1% level between the tie up and loose housed farms (103 days).

The cows of R_4 genotype lived in the redone, unbounded and bounded system 4.5 years, 4.28 years and 4.1 years, respectively. The difference between the tie and transformed stalls is strongly significant (p=0.1%). There is an also strongly significant difference (p=0.1%) between the transformed and unbounded system (77 days), and between the bounded and unbounded system (74 days).

The purebred Holstein Friesian cows had the longest lifetime in the tie-up system (5.8 year). It was 5.7 year in the redone and 5.5 years in the loose housing system. The difference is 15 days between the tie up and the transformed housing system. The cows lived 102 days longer in the redone housing system than in the loos housing system, and 117 days more in the tie up than in the loose housing system. The differences are not confirmed significantly.

According to the examination of culling causes:

The primary reason for culling was sterility in all the three housing system (21-43%). Culling for low production was the second most reason in the redone system (19-44%) and in the tie-up system (14-24%). In the loose housing system the second most reason was emergency slaughtering (9-20%).

Comparing the housing system it can be found that in the loose housing system there was the highest rate of the culling for sterility (30-43%) and death (9-20%), but the culling for low production was the fewest. (6-8%).

The udder trouble (2-27%) is the most prevalent culling cause in the tie-up system, but there is the fewest indicies of death (9-15%) and emergency slaughtering.

In the redone system occurred in the highest rate of the emergency slaughtering (10-18%) and culling for low production (19-44%), but there was the fewest culling rate for sterility (28-37%).

Analysing the culling causes by genotypes it can be stated:

By the F_1 genotype is the highest the culling rate for sterility (34-37%), but the lowest the culling for udder trouble (1-2%). With increasing the Holstein-Friesian blood rate also increased the culling rate for udder trouble and the indicies of death, but decreased the culling rate for low production. Analysing the sterility, we can state that with the increase of Holstein Friesian blood rate, the rate of culled cows decreased in the redone system, but that tendency can not be found among the cows kept in the loose housing and in the tie-up housing system. There is no significant difference in the rate of culling for emergency slaughtering among the genotypes.

According to the culling causes and the lifetime

Lifetime is the longest by the cows culled for udder trouble in all the three housing systems. (3.8-9.5 years)

The cows culled for death (4.5-6 years) and sterility (4.3-6.3years) lived the longest time in the loose housing system, and the shortest time for low production (4.3-5 years).

Cows culled for low production have the longest lifetime in the tie-up system, and the shortest time for sterility.

The lifetime of the cows culled for sterility, death and udder problem has shortened by each housing system during the cross breeding.

By the purebred Holstein Friesian the cows culled for fertility problem lived the longest period, while the cows culled for low production left the herd the earliest.

The results of my examination are agreed with the statements of Török (1986) Bozó (1987), Lehőcz (1987), Enyedi and Szuromi (1985), Stefler et al. (1988), Gáspárdy et al. (1991), Báder (1995), Gnyp et al. (1995), Grabowsky et al. (1997), Bascom (1998), so the most common culling reason is sterility.

According to the results of the examinations it can be stated that in the loose housing system there were less udder problem than in the tie-up system. Similar statement report Schubert et al. (1982), Matzke et al. (1989). Jasiorowski et al. (1994), Báder (1996), have the opposite opinion, in their examination the culling rate due to udder problem is higher in the loose housing system.

According to the examination of reproduction traits:

In the F_1 genotype the lenght of service period is under 120 days in the redone system (114 days) and in the loose housing system (114 days), but the longest in the tie-up sytem, 126 days. The difference between the tie-up and the loose housing system is 10 days, between the tie-up and redone system it is 12 days. The two differences are significant at a level p=0.1%.

The fertility index is 2.0 in the tie-up system, 2.1 in the redone system and in the loose housing system, the differences are significant at a level p=0.1%.

In the R_1 genotype the number of day from the calving to pregnancy is the shortest in the loose housing system (126 days), in the redone and tie-up system it is 131 days and 134 days, respectively. The differences are significant at a level p=1%.

The fertility index is the best (2.0) in the loose housing system, it is 2.2 in the tie-up system and it is 2.1 in the redone system, the differences between the tie-up and redone system and between the tie-up and loose housing system are significant at a level p=0.1%.

In the R_2 genotype the lenght of service period is the shortest in the loose housing system (131 day), in the tie-up system it is 137 days, and the longest (144 day) in the redone system. The difference between the redone and tie-up system is significant at a a level p=0.1%, the differents between the tie-up and the redone system and between the tie-up and loose housing system are significant at a level p=1%.

The fertility index is 2.1 in the tie-up system and in the redone system and it is 2.0 in the loose housing system. The differences are significant at a level p=1%.

In the R_3 genotype the length of service period is the longest in the redone system (156 days) and it is the shortest (132 days) in the loose housing system. By the tie stalls it is 142 days. The difference between the tie-up and the redone system (14 days) and between the redone and loose housing system (24 days) are highly significant and between the tie-up and loose housing system (10 days) is significant at a level p=1%

The fertility index is the most favourable in the loose housing system (1.8) and it is the weakest in the redone system (2.1), while it is 2.0 in the tie-up system. The differences are significant at a level p=0.1%.

In the R_4 genotype the lenght of service period is the shortest in the loose housing system (139 day), in the tie-up system it is 142 days, and the longest in the redone system (154 day). The 15 days difference between the redone and loose housing system is significant at a a level p=0.1%, the differents between the tie-up and the redone system is significant at a level p=1%. The 3 days difference between the bounded and unbounded system is not significant.

The fertility index is the best in the loose housing system (1.8) and the worst in the redone system (2.1), while it is 2.0 in the tie stalls. The differences are significant at a level p=0.1%.

By the purebred Holstein Friesian the lenght of service period is the shortest in the loose housing system (120 day), in the tie-up system it is 129 days, and the longest in the redone system (156 day). By each housing system the service period is more than 120 days. The 27 days difference between the tie-up and redone system and 36 days difference between the redone and loose housing system is significant at a level p=0.1%.

The fertility index is the best in the redone system (1.7) but it is still favourable in the loose housing system (2.0) and the weakest is in tie-up system (2.2). The differences are significant at a level p=0.1% between the bounded and redone and between the bounded and unbounded system. The diference between the redone and loose housing system is slightly significant (p=5%).

Examining the genotypes it can be established, that as growing the Holstein Friesian blood rate as extending the length of the service period to the R_4 genotype by each housing system. But it is decreasing by the pure bred Holstein Friesian in the tie-up and loose housing system. By the F_1 and R_1 genotypes the service period was the longest

in the tie up system, and in the redone system by the R_3, R_4 genotype and the pure bred Holstein Friesian.

The fertility index of pure bred Holstein Friesian was the worst by cows kept in the in the tie-up system, but it was the best in the redone system. The fertility index of the examined cross bred cows kept in the loose housing system is significantly better. Differences between the genotypes are not significant, although the fertility indexes of the purebred Holstein-Friesian is somewhat better.

The results of my examination are agreed with the statements of Szűcs et al. (1997), that there are slightly differences between the genotypes in the respect of the fertility index, but in case of service period there could be found some differences.

My results do not prove the statements of Meyer and Ötting (1974), and Jorna (1979) with respect to the fertility index, that it is better in tie up system. The results of my study are agreed with results of Platen and Lindemann (1995), and Báder (1996) in respect of better reproduction traits are common in the loose housing system. Although I got less differences in case of fertility index between the tie up and loose housing system.

Analysing the effect of the year

According to the examination of lifetime performance:

The housing system, genotypes and the year have both a significant effect on the lifetime milk production. Besides, the effect of the genotypes and housing system has together a collective effect.

The housing system, genotypes and the year have both a significant effect on the milking days. Besides, the effect of the genotypes and housing system has together a collective effect.

The housing system, genotypes and the year have both a significant effect on milk yield per milking days. Besides, the effect of the genotypes and housing system has together a collective effect.

The housing system and the genotype have no effect on the lifetime and the number of herd life, but the effect of years is significant. Besides the effect of genotypes and housing system have a collective effect also.

The housing system, genotypes and the year have both a significant effect on milk yield per herd life. Besides, the effect of the genotypes and housing system has together a collective effect.

By the F_1 genotype the tie-up system has a favourable effect on a higher lifetime production by the same number of lactations. There is 2240 kg more lifetime milk production in the tie stall than in loose housing system, with a slightly significant level.

The milk yield per milking days is considerable better in the loose housing system, than in the tieup system or in redone system. By this trait there is a strong significant differences between the three housing system.

By the R_1 genotype also the tie up system has a favourable effect on the better lifetime production and the longer lifetime, despite of in the effective milking period the loose housed cows had the higher milk production per milking time. But, that advantage is not effective in case of the milk yield per herd life. The analysing of significancy confirms the overmentioned establishments.

Similar tendency can be ascertained by the R_2 genotype.

Better lifetime production in the loose housing system can be established first time in case of the R_3 genotype during the same milking period. But that 701 kg difference is not significant. Beside the better lifetime production in the loose housing system, the lifetime is also longer, and that is confirmed statisticaly.

By the R_4 genotype there is a similar tendency. The considerable advantage of the loose housing system still can not be mentioned.

The results of the redone system farms are up to the length of the period they produced as tie stalls.

According to the examination of reproduction traits:

1. The fertility index is slightly influenced by the housing system. The genotype has no effect on the fertility, but the year has a strong effect on it. Therewith the genotype and the housing system has a common strongly significant effect.
2. The year, the genotype and the housing system each have a significant effect on the length of the service period. Besides, the effect of genotypes and housing system together has a collective effect.

In case of F_1 genotype the service period is longer in the tie stalls (136 days), than in the loose housing system (128 days), but the difference is not significant. Meanwhile, the fertility index is worse in the loose housing system, despite of the shorter service period. The differences are significant.

By the R_1 genotype the favourable or unfavourable effect of the housing system is not clear.

In case of R_2 genotype the favourable effect of the loose housing system can be stated on the reproductive traits, first of all on the service period. By the R_3 genotype also the fertility index is better in the loose housing system compared to the tie stalls.

As higher the Holstein Friesian gene ratio (R4 genotype), the more advantageously effect of the loose housing system on the insemination of the cows.

According to the examination of culling causes

In case of F_1 genotype the next culling causes were in a higher ratio: death, sterility, low production and fertility problem. There was culling in a smaller ratio by the emergency slaughtering, udder problem and other causes. The cows culled for death, emergency slaughtering, sterility, low production, and udder problem lived longer time in the loose housing system and than in the tie-up system. Vice versa the culling for reproduction problems and other causes happens earlier.

By the R_1 genotype kept in the loose housing system the highest rate of culling causes are the death, emergency slaughtering and sterility, in the tie-up system are the low production, and udder problem. There is no difference between the housing system in case of culling for reproduction problems. Cows were culled for sterility, low production, udder trouble and death had a longer lifetime in the tie-up system (4-5.9 years). Cows were culled for emergency slaughtering, reproduction problems, and other causes lived longer in the loose housing system.

The rate of death and reproduction problem is not effected by the housing system, in case of the R_2 genotype. The culling for low production and emergency slaughtering was in the highest rate by the redone system. The most frequent culling cause was the sterility in the loose housing system, while in the tie stall it was the udder problem. The cows lived the longest period in the redone system were culled for death, emergency slaughtering, and udder problem. The cows culled for low production lived the longest time in tie stall. Culling for

reproduction problems and other causes happens at the latest in the loose housing system.

In case of R_3 genotype the culling for sterility and death occurs in the highest rate by the loose housing system. The udder trouble is the highest culling rate in the tie-up system, as the emergency slaughtering and the culling for low production in the redone system. The cows were culled for reproduction problem, emergency slaughtering and death lived the longest period in the tie-up system, as well they did in the redone system for the low production and udder trouble.

In case of R_4 genotype the culling rate for low production, death and emergency slaughtering is higher in the transformed system compared to the others. Sterility was in the highest rate by the loose housing system and udder trouble by the tie-up system. Cows culled for low production, death, emergency slaughtering, udder trouble and reproduction problem lived the longest time in the redone system. The lifetime of the cows culled for sterility was the biggest in the loose housing system.

The rate of culled cows for sterility decreased by the tie-up system with the increase of Holstein-Friesian blood ratio. The same tendency can be stated in the redone system. By loose housing system it could be pointed out just in the R_2 genotype.

The culling rate because of low production is decreasing in the tie-up system, but increasing in the loose housing system during cross-breeding. The decreasing of culling rate in the redone system start just from the R_1 genotype.

It can be observed that in the tie-up system the culling rate of udder trouble is also increased with the increasing of Holstein Friesian blood rate. There is also a slightly increasing

by the loose housing system, but the genotype has no effect on that trait in the redone system.

Analysing the rate of the death on the basis of the whole population can be stated, that as the Holstein Friesian blood rate increased, the incidents of death by cows decreased.

The rate of emergency slaughtering during the cross breeding was not influenced by the tie up system, but decreased in the loose housing system.

According to the culling causes and the lifetime

The lifetime of cows culled for sterility slightly increased in the loose housing system as the Holstein Friesian blood increased.

The culling happens also in a later time by cows culled for low production during the cross-breeding in the unbounded system.

The lifetime of the cows culled for udder problem was the longest in the redone system, and it has shortened by that and the tie-up system during the cross breeding.

As increasing the Holstein Friesian blood rate there is no tendency in lifetime of cows disappeared by death. By the emergency slaughtered cows in bounded and unbounded system there is an increasing in lifetime to the R_3 genotype and decreasing by the R_4 genotype.

4. NEW SCIENTIFIC RESULTS

1. According to the examination of lifetime performance:

1.1. According to the population level examinations the loose housing system has a favourable effect on the number of lactations, but not on the number of milking days. Cows kept in the loose housing system produced 0.12-1.45 kg more milk per day, but their milking period was 117-309 days shorter as well, so the lifetime milk production was fewer with 1307-3700 kg than in the tie-up system.

1.2. The housing system, genotypes and the year have both a significant effect on the lifetime milk production, on the milk yield per milking days, and on the milk yield per herd life. Besides, the effect of the genotypes and housing system have together a collective effect.

1.3. Hungarian Spotted Cattle x Holstein Friesian cross-breeds cows produced in the tie-up system have significant better lifetime traits than the cows kept in the loose housing system, this result is in contrast with the other studies.

1.4. To consider the effect of the year I can establish that the tie up system ensures more favourable conditions for the Hungarian Spotted Cattle x Holstein Friesian F_1 genotype, the R_1 genotype and the R_2 genotype cows to reach higher lifetime production. But the milk yield per milking day is substantially better in the loose housing system than in the tie-up system. The significant examinations confirm the above establishment. I can regard that the R_3 genotype and the R_4 genotype cows have better lifetime performance in the tie-up system than in the loose housing system during the same milking days. Besides the better lifetime

production the lifetime was statistically also longer of the cows kept in the loose housing system.

1.5. The lifetime milk production of the cows produced both in the tie-up and in the loose housing system as well is worse than the result in the tie-up system, but it is better than in the loose housing system. Any the less, in the cause of milk yield per milking days there is an opposite tendency. Examining the redone system it can be determined the values of lifetime and lifetime production traits in the redone system are dependent on when the farm was transformed. In other words it is up to the period that the cows spend in the tie-up system.

2. According to the examination of lifetime traits:

2.1. The tie-up system ensures favourable condition for the longer lifetime of the cows. Cows kept in the loose housing system lived longer period than the cows kept in the tie-up system. The different Holstein-Friesian gene ratios do not influence on the favourable effect of tie-up system. The average lifetime of cows kept in the loose housing system is 4.3-5.9 years, while that of ones kept in the tie-up system is 4.1-5.4 years according to the genotypes. The differences between the two system there are 74 and 173 days significant differences.

2.2. The housing system and the genotype have no effect on the lifetime and the number of herd life, but the effect of years is significant. Besides the effect of genotypes and housing system have a collective effect also.

3. According to the examination of culling causes:

3.1. The primary reason for culling was the sterility in all the three housing system (21-43%).

3.2. Examining housing systems by culling causes:

Culling for sterility was in the highest ratio in the tie-up system (30-43%), and it was the lowest in the redone system (21-35%). Culling for low production had the highest ratio in the redone system (19-44%) and it was the lowest in the loose housing system.(6-8%)

The culling rate because of udder problem is the most prevalent in the tie-up system. (2-27%). The rate of death (9-15%) and the emergency slaughtering (7-9%) is the lowest in the tie-up system.

3.3. Analysing the sterility as a cause for culling according to the effect of years we can state, that with the increase of Holstein-Friesian blood ratio the rate of culled cows decreased. The culling rate because of low production is decreasing in the tie-up system, but increasing in the loose housing system during cross-breeding.

It can be observed that in the tie-up system the culling rate of udder trouble is also increased with the increasing of Holstein Friesian blood rate.

On the basis of the whole population it can be established, that as the Holstein Friesian blood rate increased, the incidents of death by cows decreased. The rate of emergency slaughtering during the cross breeding was not influenced by the tie up system, but decreased in the loose housing system.

4. According to the culling causes and the lifetime

4.1. Lifetime is the longest by the cows culled for udder trouble in all the three housing systems. (3.8-9.5 years)

4.2. Analysing the housing systems by culling causes:
Cows culled for udder problem have the shortest lifetime in the tie-up system (3.9-5.9 years) and the longest time in the transformed system.(4.5-9.5 years)
Cows culled for sterility lived the longest time in the loose housing system (4.5-6 years) and the shortest time in the tie-up system (4.3-5.7 years). Cows culled for low production have the longest lifetime (4.1-5.3 years) in the tie-up system. The cows culled for death lived the longest time (4.5-6 years) in the loose housing system and the shortest time in the tie-up system (4.3-5.8 years). Cows were culled for emergency slaughtering had the shortest lifetime in the tie-up system (4-5.9 years).

4.3. The lifetime of cows culled for sterility and low production slightly increased in the loose housing system as the Holstein Friesian blood increased. The lifetime of the cows culled for udder problem shortened by each housing system during the cross breeding. The lifetime of the emergency slaughtered cows increased as increasing the Holstein Friesian gene ratio to the R_3 genotype.

5. According to the examination of reproduction traits:

5.1.The insemination by cows kept in the tie-up system was less successful. The length of service period is 116-139 days in the loose housing system and 126-142 days in the tie-up system. There is a significant difference (3-10 days) between the two housing systems.

5.2.The year, the genotype and the housing system each have a significant effect on the length of the service period. Besides,

the effect of genotypes and housing system together has a collective effect.

5.3. The fertility index of cross bred cows kept in the loose housing system is significantly better (1.8-2.0) then the fertility index of the cows kept in the tie-up system (2.0-2.2). The change of housing system has no favourable effect on the fertility. The fertility index is slightly influenced by the housing system. The genotype has no effect on the fertility, but the year has a strong effect on it. Therewith the genotype and the housing system has a common strongly significant effect.

5.4. On the basis of the year it can be established that by the higher Holstein Friesian blood rate (R_3, R_4 genotypes) the favourable effect of the loose housing system can be stated on the reproductive traits. As higher the Holstein Friesian gene ratio (R_4 genotype), the more advantageously effect of the loose housing system on the insemination of the cows.

5. PROPOSALS

- Reproduction management shhould be adapted
- Continous control of the milking technology
- Prompt evaluation of the culling, whereafter to be aware of it improve feeding, breeding and technological problems
- The more detailed expansion of the culling causes and approaching it into the practice
- Introducing the type trait scoring (on the farms)
- Accomplish of a very detalied project of the aims also for each worker before transformation the farms.

6. PUBLICATIONS AND PROCEEDINGS CONNECTED TO THE Ph.D. THESES

6.1. Scientific articles

6.1.1. Foreign language publications

1. T.Kertész– E. Báder – P.Báder (2002): Effect of the housing system on the culling causes of dairy herds. Acta Agronomica Óváriensis.(in press)

6.1.2. Hungarian language publications

1. Kertész T. - Báder E. (1997): Eltérő tartástechnológiák hatása a tehenek életteljesítményére. Acta Agronomica Óváriensis, Mosonmagyaróvár. Vol. 39. No. 1-2. 163-176. p.

2. Kertész T. – Báder E. (1998): A tartásrendszerek és genotípusok hatása az élettartamra és az életteljesítményre magyar tarka x holstein-fríz keresztezett tehénállományok esetében. Acta Agronomica Óváriensis. Vol. 40. No. 1. 101-114. p.

3. Kertész T. – Báder E. (1998): Magyartarka x holstein-fríz keresztezett tehénállományok kiesési, selejtezési mutatóinak összehasonlító vizsgálata eltérő tartástechnológiák alkalmazása esetén. Acta Agronomica Óváriensis. Vol. 40. No. 1. 115-128. p.

6.1.3. Foreign language publications in proceedings in full

1. T. Kertész – E. Báder (1997): The effect of housing system on distribution of cullings. International conference of Ph.D. students. University of Miskolc. Hungary. 152-156. p. 1997. aug. 11-17.

2. T. Kertész - E. Báder (1997): Effects of various housing systems on the lifetime performance of dairy cattle I.C.A. Summer School on „Agricultural Challenges and EU Enlargement". Pannon Agricultural University Faculty of Agricultural Sciences Mosonmagyaróvár. 11-21 August 1997.,266.p.

3. T. Kertész - E. Báder (1997): Effects of various housing systems on the lifetime performance of dairy cattle. International conference of Ph.D. students. University of Miskolc. Hungary. 143-151. p. 1997. aug. 11-17.

4. E. Báder - T. Kertész - P. Báder - E. Kertészné Györffy (2001):Analysing of the culling causes in hungarian spotted x holstein friesian dairy herds, 3rd International Conference of PhD students,Miskolc, 167-172 p.

5. E. Báder – J. Iváncsics- I. Györkös – T. Kertész (2001): Effect of different housing systems on lifetime and lifetime-performance of dairy cattle, Internationaler Kongress, Wien, 2001 November 18-21,180.p.

6. T. Kertész -E. Báder - P. Báder - E. Kertészné Györffy (2002) Effect of different housing systems on the fertility of dairy cattle, Animal production in sustainable agriculture International Symposium Nitra, Slovakia, October 2-3, 2002

6.1.4. Hungarian language publications in proceedings in full

1. Kertész T. (1996): Életteljesítmény vizsgálatok előzetes eredményei (különböző management és genotípusok hatása), XXVI. Óvári Tudományos Napok

2. Kertész T. (1998): Magyartarka x holstein-fríz keresztezett tehénállományok kiesési, selejtezési mutatóinak összehasonlító vizsgálata eltérő tartástechnológiák alkalmazása esetén. IV. Ifjúsági Tudományos Fórum, Keszthely,59-65p

3. Kertész T.– Báder E.– Kertészné Györffy E.- Boross P. (2001) : Eltérő tartástechnológiák hatása a selejtezési arányokra , XLIII. Georgikon Napok Keszthely 2001. szeptember 20-21., 776-780 p.

4. Kertész T.– Báder E.– Kertészné Györffy E.- Boross P. (2001): Termékenységi mutatók alakulása kötött és kötetlen tartástechnológia alkalmazása esetén, XLIII. Georgikon Napok, Keszthely, 2001. szeptember 20-21., 771-775 p.

5. Györkös I.- Báder E.- Muzsek A.- Szili J.- Báder P.- Kertész T. (2001) :Az üszök előkészítés előtti kondíciójának hatása az első laktációs tejtermelésre. Állattenyésztés és Takarmányozás.2001. 50. 5. 471-473p. (Hungarian Journal of) Animal Production Vol. 50. 5. 2001. 471-473 p.

6. Kertészné Györffy E.–Kertész T.- Báder E.-Boross P. (2002): Selejtezési okok és az élettartam vizsgálata magyartarka x holstein-fríz keresztezett genotípusú tehénállományokban VIII. Ifjúsági Tudományos Fórum, Keszthely (CD kiadvány)

7. Kertészné Györffy E.– Báder E. - Kertész T.- Boross P. (2002):Kötött és kötetlen tartástechnológiák hatása a holstein-fríz keresztezett tehénállományok élettartamára, XLIV. Georgikon Napok Keszthely 2002 szept. 26-27. (in press)

8. Kertész T - Báder E Kertészné Györffy E.–.Boross P (2002): Eltérő tartástechnológiák hatásának vizsgálata holstein-fríz keresztezett tehénállományoknál az életteljesítmények függvényében XLIV. Georgikon Napok Keszthely 2002 szept. 26-27. (in press)

9. Kertészné Györffy E.– Kertész T.- Báder E. - Boross P. (2002):Élettartam és a selejtezési okok közötti összefüggések vizsgálata holstein-fríz keresztezett tehénállományoknál XXIX. Óvári Tudományos Napok Mosonmagyaróvár 2002. Október 3-4. (in press)

10. Kertész T.- Báder E.-Kertészné Györffy E.– Boross P. (2002):Termékenységre ható tényezők vizsgálata magyartarka x holstein-fríz keresztezett tehénállományoknál XXIX. Óvári Tudományos Napok Mosonmagyaróvár 2002. Október 3-4. (in press)

6.1.5. Popular articles

1. Báder E. - Kertész T. - Kertészné Györffy E. (2002): Eltérő tartástechnológiák hatása a tejelő tehénállományok selejtezési és kiesési okainak alakulására, Agro Napló, 2002/8 78-82p.

2. Báder E. – Györkös I.– Kertész T. –Kovács A. - Kertészné Györffy E. –Boros N. (2001): Eltérő tartástechnológiák hatása a tehenek termékenységére, Holstein Magazin (in press)