Hayvancılık Araştırma Dergisi, (1994), 4, 1: 39-42.

FERTILITY OF EXOTIC CATTLE IN CENTRAL ANATOLIAN VILLAGES

Olaf THIEME[1] **Mehmet KARAZEYBEK**[2]

Orta Anadolu Köy Sürülerinde İthal Irk Sığırların Döl Verimliliği

ÖZET

Bu araştırmada, Konya ve Karaman illerinin köylerinde yetiştirilen ithal İsviçre Esmeri ve Holstein sığırlar ile burada doğmuş dişi döllerinin, döl verimleri incelenmiştir. Araştırmada, 72 işletmeden 708 ineğin 1988-1992 yılları arasındaki verileri değerlendirilmiştir. Genotip ve çevrenin etki paylarının belirlenmesinde, en küçük kareler analiz yönteminden yararlanılmıştır.

İlk buzağılama yaşı, Esmer İsviçre ve Holstein sığırlarda sırasıyla 27.1 ve 26.1 ay olarak saptanmıştır (P<0.05). Konya ve Karaman'da doğmuş düveler, ithal düvelerden 2.4 ay daha erken buzağılamışlardır (P<0.001). Buzağılama aralığı bakımından, işletmeler arasında istatistik önemli farklılık (P<0.001) olduğu halde, ırklar arası farklılığın önemli olmadığı anlaşılmaktadır. Ortalama buzağılama aralığı ise 410.7 gün olarak tesbit edilmiştir. Doğumdan itibaren, ilk yıl içerisinde buzağı ölüm oranı %10.5 olarak saptanmış olup, buzağı ölümlerinin (% 6.5) büyük ölçüde ilk iki günlük yaşta gerçekleştiği anlaşılmaktadır. Buzağı ölüm oranı bakımından, ırklar arası farklılıkların istatistik önemli olmadığı belirlenmiştir. Ortalama buzağılama sayısı ve sürüden çıkma yaşı sırasıyla 2.62 ve 62.6 ay olarak hesaplanmıştır. İthal inekler, 1.47 fazla buzağı vermiş olup sürüde 29.9 ay daha fazla kalmışlardır (P<0.001). İsviçre Esmeri ineklerin, sürüde kalma süresi (verim süresi) biraz daha uzun olma eğilimindedir.

Sürüde kalma süresi hariç tutulacak olursa, işletmelerde döl verimi tatmin edici düzeydedir. Elde edilen verilere göre, döl verimi açısından her iki ırkın da Orta Anadolu koşullarında başarılı bir biçimde yetiştirileceği söylenebilir. Ancak, döl verimi açısından İsviçre Esmeri ile Holsteinler arasında, küçük farklılıklar olduğu da anlaşılmaktadır.

ANAHTAR KELİMELER: İsviçre Esmeri, Holstein, ilk buzağılama yaşı, buzağılama aralığı, buzağı ölüm oranı, sürüde kalma süresi (Verim süresi).

SUMMARY

The fertility performance of imported Brown Swiss and Friesian cattle and their locally born daughters was studied on village farms of the Konya and Karaman provinces. The data available refer to 708 cows from 72 farms over the period 1988 to 1992. Least squares analyses were used to study the influence of genetic and environmental effects.

Age at first calving was 27.1 months and 26.1 months for Brown Swiss and Friesians, respectively (P<0.05). Locally born heifers calved 2.4 months earlier than imported heifer (P<0.001). The average calving interval was 410.7 days with significant differences (P<0.001) between farms but not between other environmental influences and breeds. Mortality during the first year was 10.5%, with the majority of calves (6.5%) dying until the second day. The difference between the two breeds was small and not significant. The average number of calvings and age at disposal were 2.62 and 62.6 months, respectively. The imported cows produced 1.47 more calves and remained 29.9 months longer in the herd (p<0.001). Brown Swiss tended to have a longer herd life.

With the exception of length of herd life, fertility on the studied farms was acceptable. There were only small differences between Brown Swiss and Friesian, and the present data show, that from the fertility point of view both breeds could be kept successfully under Central Anatolian conditions.

KEY WORDS: Brown Swiss, Freisian, age at first calving, calving interval, calf mortalitiy, herd life of cows.

INTRODUCTION

Several development projects have been carried out during the last 20 years in Türkiye, to increase the numbers of valuable cattle breeding stock and to promote commercial dairy production. Importation of exotic cattle to the Konya province began within the III. Livestock Development Project. With the help of foreign credit, commercial dairy farms were established in the Karaman and Akşehir regions of the Konya province. This program was later continued under the umbrella of other projects and extended to larger areas of the province.

Fertility is an important criteria to judge the successful adaptation and profitability of the imported cattle and their progeny. Age at first calving and calving interval of exotic cattle have been studied in Türkiye for Brown Swiss (5, 7, 9) and Friesian (5, 7, 14, 16) mainly on Government farms and to a lesser extend under village conditions (12, 15). Fewer studies are available about mortality of calves (2, 5, 13) and no information about herd life of cows in villages.

Imported cattle have to adapt to a different environment and to the management of the new farms. The influence of this process of adaptation on the fertility performance of the cattle can be accessed by a comparison of the imported cows with their locally born daughters. Information about this influence from other countries (4, 18) are variable.

During the earlier years of the importation program the Government and farmers preferred Brown Swiss cattle. This situation however, has changed with the years in favor of Friesian cattle. If fertility is a good indication of adaptability, comparison of the results from the two breeds will give useful hints on the comparative suitability for particular farm conditions.

MATERIAL and METHODS

The data basis for this study are calving dates and information about date and reason for animals leaving the herd, from village farms in the Konya and Karaman provinces. These data were collected by the extension staff of the development projects during regular monthly farm visits in the years 1988-1992. All farms of the study were built up with in calf heifers as part of a development program. The majority of

1: The author was Chief Technical Adviser in the Konya Livestock Project (UNDP/FAO, TUR/87/018).
Present Adress: Sternstrasse 10, 37083 Göttingen, F.R. Germany
2: Tarım İl Müdürlüğü, KONYA.

the heifers had been imported directly from Germany and only a small number of farms (10) had been built up with heifers from local Government farms. Table 1 gives information about the structure of the recorded performance data.

All farms kept the exotic cattle for commercial dairy production. Management and feeding was variable but showed certain common features. Cows were kept in tying stalls without or little bedding during winter. Ventilation and light levels of the sheds were poor on many farms. During the summer months most cows were kept in open yards, but grazing was rare and restricted to roadside and stubble. The majority of cows was stall fed all year, with chopped straw and concentrates being the main feed sources. Fresh lucerne was fed during summer on most farms, but very few farmers prepared lucerne hay for winter feeding. Calves were reared by feeding whole milk, partly bucket fed but often by allowing to suck their dams. Mating of the cows was by bulls owned by the farmers or their neighbours and AI had only little importance.

Traits analyzed were age at first calving (AFC), calving interval (CI), mortality during the first year, and as indicators for herd life of cows (HLC) the number of calvings and the age of the cows at disposal. To allow for possible incomplete information, data on AFC were restricted to the range of 17-40 months and on CI to 300-600 days. Only cows which had left the herd were used to calculate the length of herd life. The data were analyzed, using the Least Squares procedure (8) with mixed models including the farm as random effects for AFC and CI and with a fixed model for HLC. Details about the respective models are given with the results.

RESULTS

Calving Season

The distribution of calvings during the year is shown in Figure 1. The majority of calvings occurred in the first half of the year with a peak of 14% during March. Calvings in autumn were rare.

Age at First Calving

The Table 2 shows the effects included in the analysis of AFC, and levels of significance. The means for the different groups are given in Table 3. The overall mean for AFC was 26.6 months, with Friesian calving 1 month earlier than Brown Swiss ($p<0.05$) and heifers born locally calving 2.4 months earlier than the imported heifers ($p<0.001$). The effects of year of birth, month of birth and of farm also had a highly significant influence on AFC, but with no clear trends.

Calving Interval

The effects included in the analysis of CI, and levels of significance are presented in Table 2. The averages for the different groups are given in Table 4. The overall mean for CI was 410.7 days. There were differences between the means from the two breeds and the two different origins of the cows, but which are statistically not significant. Figure 2 shows, that a certain proportion of the cows had fertility problems, causing calving intervals longer than 500 days. The analysis of variance indicates that factors caused by the individual farm are the main reason. The effects of year of calving, month of calving and lactation number contribute only little to the variation of the calving intervals and are statistically not significant.

Mortality of Calves

The death rates of calves from the recorded farms are given in Table 5. The general mean of losses during the first year of life was 10.5%. Abortions contributed with 1% to the mortality rates and stillbirth and losses during the first day with 5.5%. Another 2.3% of the calves died during the first month and 1.7% until the completion of the first year. Analysis of variance with a sub-sample of the data showed significant influences ($p<0.05$) of month of birth and year of birth on mortality, but with no clear pattern. There were no influences of breed, sex and parity. Because the adjusted means from the subsample were very similar to the results from the complete data set, only the latter are given in Table 5.

Herd Life of Cows

The results from the analysis of variance for the traits number of calvings and age at disposal and the adjusted means for the different groups are given in Table 6. The average number of calvings was 2.62, and cows left the investigated herds at an average age of 62.6 months. With the exception of genotype on number of calvings all effects had a highly significant ($p<0.01$) influence on the investigated traits. The herd life of the Friesian cows was shorter than Brown Swiss, and the imported cows were kept distinctly longer (1.47 calv-

Table 1. Structure of Recorded Performance Data.

Factor	Farms	Cows	Cows/ Farm	Rocorded Years/Farm
Karaman	36	397	11.0	6.2 (2-13)
Akşehir	27	273	10.1	5.8 (4-13)
Other	9	38	4.2	5.0
BREED				
Brown Swiss	30	350	11.7	6.5 (2-13)
Freisian	42	358	8.5	5.5 (3-11)
ALL	72	708	9.8	5.9 (2-13)

Table 2. Results of Analysis of Variance (F-Values).

Age at First Calving		Calving Interval	
Year of Birth	3.1 ***	Year of Calving	1.3 N.S.
Month of Birth	2.4**	Month of Calving	1.3 N.S.
Origin	26.9***	Origin	3.1 N.S.
Gnotype	4.8*	Lactation Number	0.7 N.S.
Farm:Gnotype	2.7***	Genotype	2.8 N.S.
		Farm: Genotype	3.5***

*: P<0.05; **:P<0.01; ***:P<0.001; N.S.: Not significant:

Table 3. Least-Squares Means for Age at First Calving (Months).

Factor	No	Mean	ST. Dev.
GENOTYPE			
Brown Swiss	310	27.1 a	0.50
Friesian	425	26.1 b	0.49
ORIGIN			
Imported	326	27.8 a	0.46
Born Locally	409	25.4 b	0.45
OVERALL	735	26.6	0.40

Means with no common superscript are significantly different (P<0.05)

Table 4. Least-Squares Means for Calving Interval (days).

Factor	No	Mean	ST. Dev.
GENOTYPE			
Brown Swiss	765	420.3	10.93
Friesian	763	401.1	13.90
ORIGIN			
Imported	991	418.1	10.32
Born Locally	537	403.3	11.40
LACTATION NUMBER			
First	592	412.1	10.75
Second	428	408.1	10.66
Third	271	404.2	11.03
Fourth	141	416.6	12.40
> Fourth	96	412.4	14.51
OVERALL	1528	410.7	10.03

Table 5. Death Rates of Exotic Calves According to Period of Loss and Genetic Group.

Breed	No Calves	Period of calf Mortality Abortion	1 st Day	1 st Mon.	1 St Year
Brown Swiss	1147	1.0 %	7.1 %	9.0 %	10.2 %
Friesian	1051	1.0%	5.9 %	8.5 %	10.8 %
ALL	2198	1.0 %	6.5 %	8.8 %	10.5 %

Table 6. Results of Analysis of Variance and Least-Squares Means for Herd Life of Cows.

	No of Calvings		Age at Disposal (Months)	
Factor	No	Mean	No	Mean
GENOTYPE		N.S.		***
Brown Swiss	324	2.73	336	67.1 ^{a}
Friesian	217	2.52	217	58.0 ^{b}
ORIGIN		***		***
Imported	271	3.36 ^{a}	260	77.5 ^{a}
Born Locally	270	1.89 ^{b}	293	47.6 ^{b}
WAY OF DISPOSAL		***		***
Sold for Breeding	342	2.58 ^{a}	341	59.9 ^{ac}
Sold for Slaughter	116	2.75 ^{ab}	127	69.0 ^{b}
Slaughter	22	3.17 ^{b}	22	65.7 ^{ab}
Death	61	2.00 ^{c}	63	55.6 ^{c}
OVERALL	541	2.62	553	62.6

***:P<0.001; N.S. Not significant, Means with no common superscript are significantly different (P<0.05)

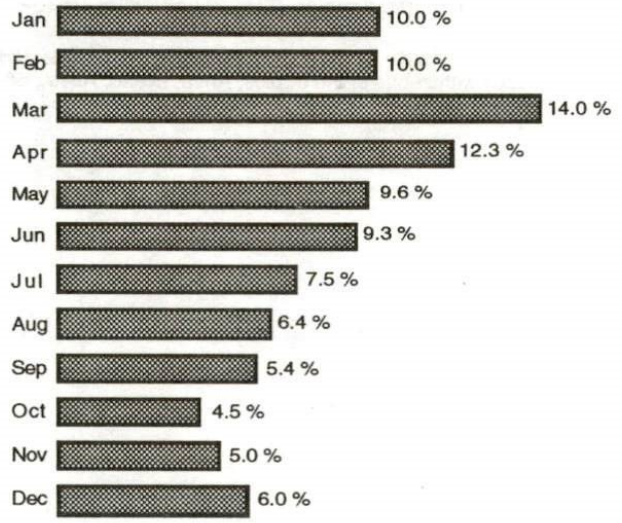

Figure 1. Seasonal distrubition of calvings.

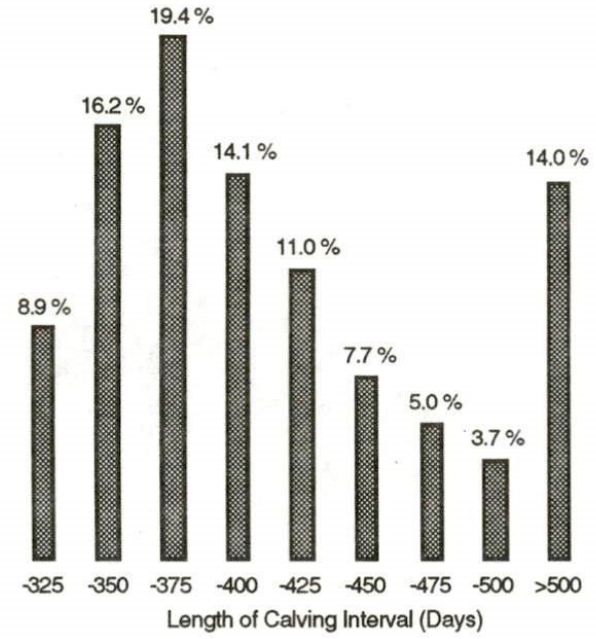

Figure 2. Distrubtion of calving intervals.

ings or 29.9 months more) than their locally born daughters.

DISCUSSION and CONCLUSIONS

The study has revealed significant influences of genetic and environmental effects on the investigated fertility traits.

The average age at first calving for the locally born heifers was about five months lower than for heifers of the same breeds in the country of origin (10, 11) and also lower than on Government farms in Türkiye (7, 9, 16, 17). Similar low figures however, have been reported for Friesian heifers from other private farms in Türkiye (12, 15). Age at first calving is largely influenced by the growth intensity of the heifers and the preferences of the farmers. Good quality roughage is scarce in the prevailing feeding system of the private farms, and the costs and easy availability favor the use of large quantities of concentrates. It seems understandable, that farmers who intend to reduce total feeding costs under these conditions prefer early calving.

The mean calving interval for the Friesian cows was very close to the pooled average (399 days) of different sources from Türkiye (5, 12, 14, 15, 16, 17) and to the performance of Friesian cows in Germany (1). The longer calving interval for the Brown Swiss cows, observed in this study, is in line with other sources from Türkiye (5, 7, 9) but not from Germany (1). A longer calving interval for the imported cows compared to their locally born daughters was also noticed in data from Morocco (4). It may indicate problems of adaptation, but it is also very likely that culling intensity for these two groups was different. A review of the literature (6) found, that farm effects are an important source of variation for calving intervals, which is supported by the present study. The highly significant influence of the farm effect reveals, that longer calving intervals under the studied conditions are more likely caused by problem farms rather than by problem cows within farms.

Figures about mortality rates of Friesian and Brown Swiss calves from other sources in Türkiye are similar (2, 3, 13) or distinctly higher (5) than in the present study. As the data basis was small in most cases and restricted to one State Farm, those results are more likely indicators for the management of the farms, rather than for the investigated breeds. The mortality rates in the present study are much better than in other countries with imported exotic cattle (18) and the figures for stillbirth and early death are very similar to results from the country of origin of the cattle (10, 11). If one considers, that parts of the calf losses may have been due to problems during the early phases of the newly established dairy farms, the mortality rates on the investigated farms seem acceptable.

No other study about length of herd life is known from Türkiye. Information for average age at disposal from Germany (10, 11) and for imported cows to Morocco (4) shows, that the productive life of these cows was about 1 year longer than in the present study. The average number of calvings however, was identical with result from a review on exotic cattle imported into different, mainly tropical countries (18). The information about the main ways of disposal (sold for either breeding or slaughter) does not disclose the reasons for culling but only explains the buyer (farmer or butcher). Very striking is the extremely short herd life of the locally born cows, but the available data set gives no obvious answer to this occurrence. Possible explanations for early culling could be low performance, but also management decisions independent from the performance.

The fertility performance of the exotic cows on the private farms in the Konya area was comparable or better than the performance of cows from the same breeds on Government farms in Türkiye. With the exception of length of herd life, fertility on the studied farms was also similar to results from the country of origin. It is the lower age at first calving, and its possibly negative influence on herd life of the locally born cows which may need attention. There were only small differences between Brown Swiss and Friesian, and the present data show, that from the fertility point of view both breeds could be kept successfully under Central Anatolian Conditions. The decision for either of the two breeds needs therefore substantiated on their milk and/or meat producing capacity.

REFERENCES

1. ADR (1993) Rinderproduktion in der Bundesrepublik Deutschland 1992, Zucht, Besamung, Leistungsprüfung.
2. Akcan A, Alpan O (1984) Holştayn ve Holştayn x Güney Anadolu Kırmızısı (GAK) melezlerinde bazı verim özellikleri, I. Büyüme ve yaşama gücü, DOĞA Bilim Dergisi D1, 8 (3) 216-227.
3. Alpan O,Yosunkaya H, Aliç K(1976) Türkiye'ye ithal edilen Esmer, Holştayn ve Simental sığırlar üzerinde karşılaştırmalı bir adaptasyon çalışması, Lalahan Zoot.Araşt. Enst. Dergisi, XVI (1-2) 3-18.
4. Bradly M (1978) Die Leistungsentwicklung schwarzbunter Importrinder und deren Nachzucht in Marokko, Doktor Thesis, Univ. Göttingen.
5. Cengiz F (1982) Malya ve Koçaş D.Ü. Çiftlikleri koşullarında Siyah-Alaca ve Esmer sığırların çeşitli özellikler bakımından karşılaştırılması, A.Ü. Zir.Fak., Doktora Tezi, Ankara.
6. Galina CS, Arthur GH (1989) Review of cattle reproduction in the tropics, Part 2. Parturition and calving intervals, Anim. Breed. Abstr., 57 (8) 680-686.
7. Güven Y (1977) Ankara Şeker Fabrikası Çiftliğinde yetiştirilen Siyah-Alaca ve Esmer ırk sığırlarda süt ve döl verimi üzerinde karşılaştırmalı araştırmalar. A.Ü. Zir.Fak., Diploma sonrası Yüksek Okulu Doktora Tezleri Özetleri, 782-798.
8. Harvey WR (1987) LSMLMW, Computing procedures and applications, PC Version (PC-1).
9. İnal Ş, Alpan O (1989) Konya Hayvancılık Merkez Araştırma Enstitüsündeki Esmer ırk sığırların döl verimi performansı, Lalahan Hay. Araşt. Enst. Dergisi, 29 (1-4) 1-20.
10. Landeskontrollverband Schleswig-Holstein e.V., (1993) Die Leistungsergebnisse des Kontrolljahres 1992.
11. Landeskuratorium der Erzeugerringe für tierische Veredelung in Bayern e.V. (1993) Leistungsprüfung-und Qualitatsprüfung in der Rinderzucht in Bayern 1992, Ergebnisse und Auswertungen.
12. Özcan L, Pekel E, Kaftanoğlu O (1976) Çukurova bölgesi tarım işletmelerinde yetiştirilen Siyah Alaca sığırların döl ve süt verimi ile vücut özellikleri üzerinde araştırmalar. Ç.Ü. Zir.Fak. Yıllığı, 7(4) 257-273.
13. Sağkal S (1978) Sakarya yöresinde Holştayn ve muhtelif genotipteki Holştayn x Yerli ırk melezlerinde bazı verim özellikleri, Doktora tezi, TÜBİTAK Matbaası, Ankara.
14. Şekerden Ö, Özkütük K, Pekel E (1987) Amasya ili entansif süt sığırcılığı işletmelerindeki Siyah Alaca sığır populasyonunun süt ve bazı döl verim özellikleri Ç.Ü. Zir.Fak. Dergisi, 2(3) 56-66.
15. Şekerden Ö, Özkütük K, Pekel E (1989) Gelemen Tarım İşletmesi Siyah Alaca sığır populasyonu verim özellikleri. 1. Döl verim özellikleri, Ç.Ü. Zir.Fak. Dergisi, 4(1) 27-36.
16. Şekerden Ö, Pekel E (1982) Reyhanlı Devlet Üretme çiftliğinde yetiştirilen saf Siyah-Alaca, Kilis tipi Güney Kırmızısı sığırlar ve bunların melezlerinin döl ve süt verim özellikleri ile bazı parametrelerin tahmini üzerine araştırma, Ç.Ü. Zir.Fak., yıllığı, 13 (3-4) 14-27.
17. Tuncel E, Eker M (1971) Yalova Devlet Üretme Çiftliğinde yetiştirilen Siyah-Alaca sığırlarda döl ve süt verimiyle ilgili özellikler üzerinde araştırmalar, A.Ü. Zir.Fak.Yıllığı, 21 (3-4) 410-430.
18. Vaccaro LP de (1990) Survival of European dairy breeds and their crosses with zebus in the tropics, Anim. Breed. Abstr., 58 (6) 475-494.