

# **PERFORMANCE OF SIMMENTALER CATTLE IN SOUTHERN AFRICA: A SCIENTIFIC REVIEW**

**F.W.C. Nesor, J.B. van Wyk & G.J. Erasmus**

Department of Animal, Wildlife and Pasture Sciences, University of the Free State, PO Box 339,  
Bloemfontein, South Africa

## **Introduction**

The Simmentaler in southern Africa has a rich and colorful history. South West Africa, now Namibia was the first country outside Europe, to establish the breed successfully. The first imports were in 1893, by the then German Government, to improve the milk and meat qualities of the indigenous cattle. In 1905 Simmentaler cattle were imported to South Africa by the then President of the former Orange Free State Republic, Mr. M.T. Steyn. A breed society for southern Africa was formed in 1964. At present nearly a third of all stud breeders of British and European breeds in Southern Africa farm with Simmentaler cattle. The breed society handles the registration and performance testing for Simmentaler breeders in South Africa, Namibia, Botswana, Zimbabwe and Kenya where the breed is mainly utilized for beef production under extensive semi arid conditions. The aim of the paper is to quantify the performance of the Simmentaler in southern Africa.

## **Performance of Simmentaler cattle in the National Beef Cattle Improvement Scheme**

In 2001, 44% of all Simmentaler stud breeders with 54% of the total number of females in the breed participated in the National Beef Cattle Improvement Scheme. The breed excels in all the different categories of the Scheme. Birth weight in the breed is only 3kg higher than the national average for all breeds, while the average weaning weight under extensive conditions (the age at which the majority of animals in South Africa are marketed to the feedlots) in the breed is 25 kg higher. The breed also excels in the standardized growth tests (Phase C). These tests are conducted immediately after weaning for a period of 112 days, after an adaptation period of 28 days. The animals are therefore about a year old when the test ends. At this stage the

Simmentaler breed weighs on average 70 kg more-, grows 245g per day faster and has a better feed conversion ratio than the national average (Anon, 1999).

The cows calve, on average, at 31 months for the first time. This is 3 months earlier than the national average. The intercalving period in the breed declined from 430 days in 1993 to 408 days in 1998. This is also better than the national average of 423 days. In Table 1 the performance of the breed in comparison with the national average is presented

Table 1. The performance of the Simmentaler breed in comparison with the national beef herd. (Anon, 1999) The majority of the weight traits are measured under extensive conditions.

Trait	Simmentaler	National average
Number of studs in 1998	397	2821
Number of females in studs	25410	221718
Birth weight	39	36
Weaning weight	240	215
Twelve month weight (Female)	299	252
Eighteen month weight (Females)	383	228
Cow weight at calving	543	490
Cow weight at weaning	544	501
Weaning weight as a % of cow weight	46.1	45.2
Final weight (Standardized growth test)	542	455
ADG (Standardized growth test)	1898	1653
FCR (Standardized growth test)	6.60	6.68
Age at first calving	31	34
Inter calving period	420	423

The outstanding performance of the Simmentaler breed in the National Beef Improvement Scheme, especially in the standardized growth tests, has done much to increase its popularity in southern Africa.

### **Genetic evaluations**

Breedplan International has become responsible for the genetic evaluation of the breed since 2001. This could path the way for a joint genetic evaluation of the Simmentaler breed in South Africa, Namibia, New Zealand and Australia. Currently, 70% of all stud breeders send in data for the genetic evaluations. This is outstanding if one consider that participation is not compulsory. Emphasis in the evaluations is both

on fertility and growth traits. The heritability estimates used in the genetic evaluation are presented in Table 2

Table 2. Heritability estimates used in the genetic evaluations of the Simmentaler breed in southern Africa.

Trait	Heritability
Direct: Birth weight	0.37
Direct: 200-Day weight	0.18
Direct: 400-D weight	0.27
Direct: 600-Day weight	0.30
Direct: Mature Cow Weight	0.39
Direct: Scrotal Size	0.36
Direct: Days to Calving	0.06
Maternal: Birth weight	0.07
Maternal: 200-Day weight	0.10

The majority of these heritability estimates are comparable with the literature values in a number of South African breeds. The low estimates for the maternal traits are, however, surprising. A zero genetic correlation between direct and maternal traits is assumed in the evaluations. A number of recent studies question the high negative correlation used in genetic evaluations in a number of countries. The genetic correlation estimates between the weight traits were generally high except for weaning weight with mature cow weight, which was medium, and yearling weight with final weight, which was very high. The genetic correlation estimates between the weight traits and scrotal size as well as days to calving were generally low.

In Figure 1 the genetic trend for birth weight is presented. The increase in birth weight over the past 28 years was only 1.2 kg. This is outstanding if one considers the high genetic correlation that exist between birth- and weaning weight and what the breeders achieved with weaning weight (Figure 2). The breeders managed to increase direct weaning weight by more than six kg over the same period. This was achieved without sacrificing the outstanding milking properties of the breed. Over the same period the maternal breeding values, which is a good indication of the animal's ability to produce milk, increased by at least two-kg.

The increase in 400-, 600- and mature cow weight (Figure 3) was more or less 10 kg over the 28-year period. The change in especially mature cow weight could be disadvantageous as it could lead to a decrease in efficiency and adaptability.

### **Animal breeding research**

The research under extensive conditions at the Mara, Omatjenne and Vaalharts research stations has done much to increase the popularity of the breed in southern Africa. Five different breeds were compared at Omatjenne in Namibia. In nearly all the traits measured the Simmentaler was superior to both the indigenous Sanga and exotic breeds. Research at Mara has shown that in terms of production/ hectare the Simmentaler was nearly 9% superior to a Sanga breed, while the Simmentaler x Sanga was 16% more efficient than pure Simmentalers. These results contradicted the belief that the larger Simmentaler cows would not perform well under less favorable conditions. In fact the superiority of the Simmentaler cows, in terms of kg beef produced per hectare, increased to 18% under sup-optimal conditions (Ludemann, 1980).

Similar results were obtained under intensive and semi intensive conditions. In the high rainfall sourveld areas of Kwazulu Natal Simmentaler steers were 36% more efficient in terms of feed conversion than the indigenous breeds (Van Niekerk *et al.* 1986). These results correspond to results obtained by de Brouwer (1998). In a comparison of Simmentaler with Sanga cattle he concluded that Simmentaler cattle returned superior biological and economical performance under intensive conditions. It was also showed that it is possible for the Simmentaler to calve at 24 months of age, provided enough feed is available. Van der Merwe and Schoeman (1995) obtained similar results under relative unfavorable conditions. They found a calving rate of 60.8 and 79.5% and a re-calving rate of 42.4 and 71.2% for Simmentaler heifers mated at two and three years, respectively. However, van Niekerk *et al.* (1986) concluded that Simmentaler heifers mated at a young age (14-15 months) produce as good calves at weaning provided they were mated three weeks earlier than the cowherd. He recorded a calving rate of 95 % and a re-calving rate of 68%.

These results are confirmed by a study done by Louw (1984), where cows which yielded weaner calves as end-product were kept under a stocking rate of between 3.0 and 6.74 cows and calves/ha on kikuyu pastures. The Simmentaler cows produced calves that weaned 24 kg heavier than the other *Bos taurus* breed in the study. They also produce 1.4 liters more milk per day than the other *Bos taurus* cows of similar weight. At the highest stocking rate, where feed could be expected to be scarce at times, the superiority of the Simmentaler cows in terms of production per hectare was in fact greater than when food was abundant. This study once again demonstrated how important milk production is in determining calf growth. About 40% of the differences in weaning weight could be contributed to the variation in milk production of the dam. This factor was as important as the effect of stocking rate, breed, calving date and sex of the calf combined. It is interesting to note that although there were no big differences between the milk production capabilities of the Simmentaler cows and the *Bos taurus* crosses, the Simmentaler calf managed to utilize the milk more efficiently. The Simmentaler calves needed 1.3 liters less milk/kg gain.

A study by Olivier (1997) in which he investigated dystocia in Simmentaler cattle confirms the appreciable impact of sex on birth weight and hence dystocia. However, sex also has an independent effect on dystocia. A high heritability of 0.35 indicates that incidence of dystocia can be reduced by selection.

### **Crossbreeding**

The Simmentaler is popular in crossbreeding. Several crossbreeding studies and experiments have been conducted with the Simmentaler. In an analysis of the crossbreeding experiment at Mara, Schoeman *et al.* (1993) indicates that the use of Simmentaler sires had a pronounced effect on all traits measured. The additive contribution of the Simmentaler was a positive 21.9, 21.9, 21.6 and 22.6 percent for birth weight, weaning weight, cow productivity and cow efficiency over those of the Sanga. Its maternal ability was also superior to all other breeds in the experiment. These results correspond to the results obtained by Van Zyl *et al.* (1992 a), who found that Simmentaler dams weaned heavier calves than both *Bos taurus*, synthetic *Bos taurus* and *Bos indicus* dams. Dams serviced by Simmentaler sires also exhibited a significantly shorter calving interval and were therefore more productive than its *Bos taurus*, synthetic *Bos taurus* and *Bos indicus* counterparts Van Zyl *et al.* (1992b). The

mean re-calving rates for the Mara Simmentaler cows were 93% (Lademann & Schoeman, 1994), which reflects the high fertility in the breed.

Mentz *et al.* (1979a) compared the net weaner output per cow for various sire breeds crossed with Afrikaner cows at the Vaalharts research station. In the trial the Simmentaler out performed all other breeds. This superiority continued in the post weaning growth tests (Mentz *et al.* 1979b). Interestingly enough, the Simmentaler crosses performed relatively better under extensive than intensive conditions.

In an investigation into the influence of Simmentaler cattle in a multibreed synthetic beef cattle population on pre-weaning growth traits, Schoeman *et al.* (2000) found that an increase in the proportion of Simmentaler genes lead to an increase in birth weight and weaning weight, while cow efficiency remained constant. They concluded that the metabolic size of the dam increased at the same rate as the weaning weight of the calf, when the proportion Simmentaler genes increased in the population. They also found that the increase in weaning weights could mainly be contributed to the better maternal ability, which coincides with the increase in the proportion of Simmentaler. The effect of an increase in the proportion of Simmentaler breeding is clearly illustrated in the Figure 4.

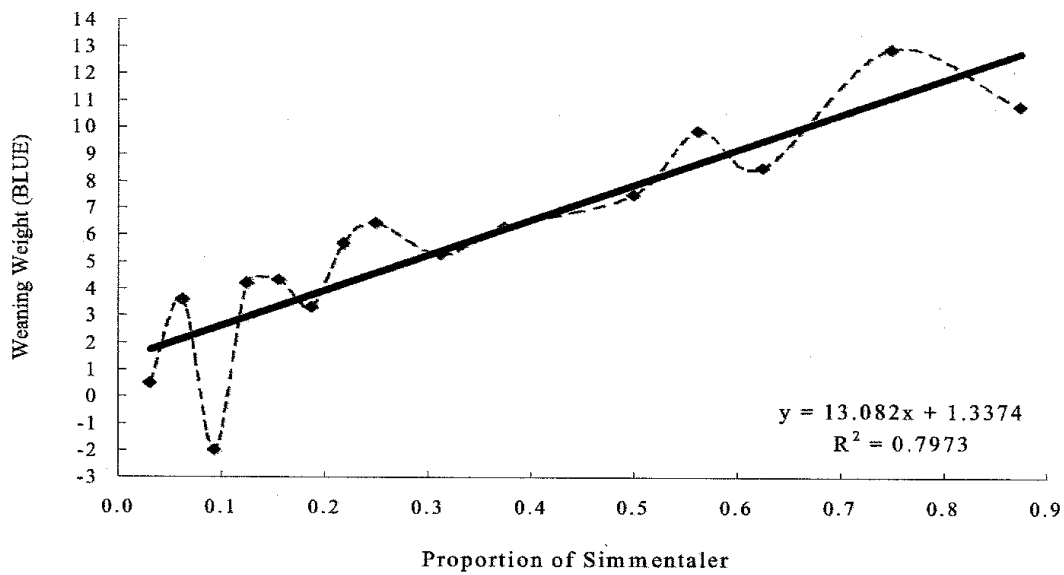


Figure 4. The effect of an increase in the proportion of Simmentaler breeding on weaning weight (Schoeman *et al.* 2000).

In an crossbreeding experiment on carcass composition, using several sire breeds, the late maturing Simmentaler sired steers had a higher percentage meat in the carcass, a higher bone: muscle ratio and a lower percentage bone than the steers sired by the earlier maturing sires. (De Bruyn, *et al.*, 1992)

### Conclusion

The outstanding characteristics of the breed is well summarized in a study by Schoeman (1996) where he concluded that the Simmentaler is among the highest ranking breeds for all traits and that this makes the breed a logical choice as a terminal sire line but most likely also as a dam line under favorable conditions.

### References

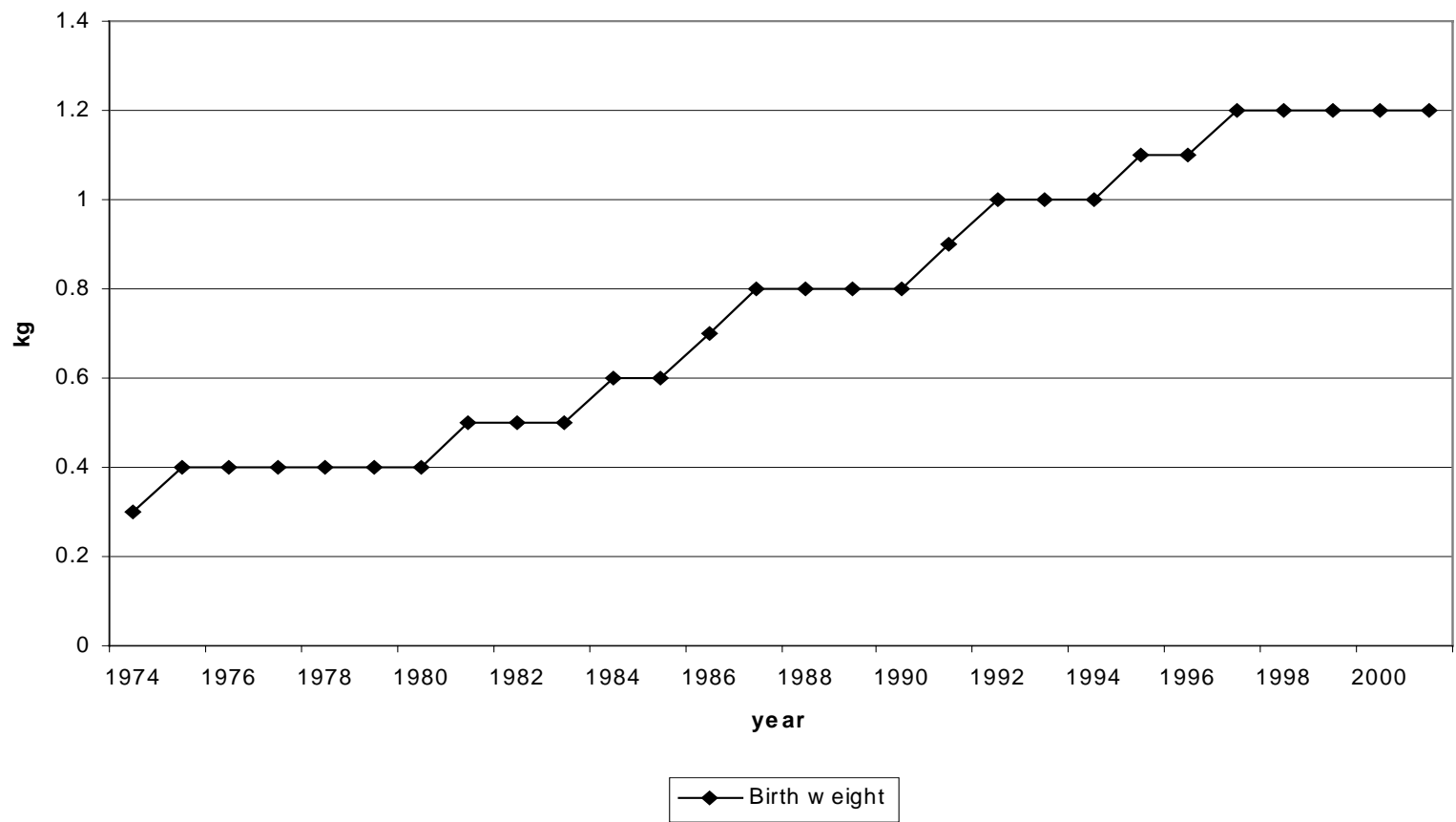
- ANON, 1999. Beef breeding in South Africa. Editors M.M, Scholtz, L., Bergh & D.J., Bosman
- DE BROWER, C.H.M., 1998. Beef cattle systems for weaner production in the western highveld of South Africa. Ph D thesis, University of the Free State

- DE BRUYN, J.F., NAUDE, R.T., HOFMEYER, J.H., MEISSNER, H.H. & ROUX, C.Z., 1992.** The influence of genotype of sire and physiological type on carcass composition. Proc. 38<sup>th</sup> International Congr. Meat Science and Technology, Clermont-Ferrand, France. Aug. 23-28, Helsinki, Finland.
- LADEMANN, E.E. & SCHOEMANN, S.J., 1994.** Factors influencing re-calving rate in lactating beef cows in the sweet dry bushveld of northern Transvaal. *S. Afr. J. Anim. Sci.* 24, 30-33
- LOUW, B.P., 1984.** Intensive beef production on cultivated pastures in a sub-tropical environment. Ph D thesis, University of Natal
- LUDEMANN, F., 1980.** Streef na meer vleis per hektaar. *Landbouweekblad* 26 September
- MENTZ, A.H., ELS, D.L. & COETZER, W.A., 1979a.** Crossbreeding with the Africander dam as basis. 2. Weaning performance of progeny of various sire breeds. *S. Afr. J. Anim. Sci.* 5, 53-60
- MENTZ, A.H., ELS, D.L. & COETZER, W.A., 1979b.** Crossbreeding with the Africander dam as basis. 3. Post-weaning growth performance of progeny of various sire breeds. *S. Afr. J. Anim. Sci.* 9, 209-214
- OLIVIER, P.J., 1996.** An investigation into dystocia in Simmentaler cattle. M. Sc. thesis, University of the Free State
- SCHOEMAN, S.J., VAN ZYL, J.G.E., & DE WET, RENSIA, 1993.** Direct and maternal additive and heterotic effects in crossbreeding Hereford, Simmentaler and Afrikaner cattle. *S. Afr. J. Anim. Sci.* 23, 61-66
- SCHOEMAN, S.J., 1996** Characterization of beef cattle by virtue of their performances in the National Beef Cattle Performance and Progeny Testing Scheme. *S. Afr. J. Anim. Sci.* 26,15-20
- SCHOEMAN, S.J., JORDAAN, G.F. & SKRYPZECK, H., 2000.** The influence of proportion of Simmentaler breeding in a multibreed synthetic beef cattle population on preweaning growth traits. *S. Afr. J. Anim. Sci.* 30, 98-109
- VAN DER MERWE, P.S. & SCHOEMAN, S.J., 1995.** Effect of early calving of Simmentaler heifers under an extensive management system. *S. Afr. J. Anim. Sci.* 25, 36-39
- VAN NIEKERK, A., LISHMAN, A.W., & LESCH, S.F., 1986.** The reproductive responses of two breeds of beef cows and the performance of their progeny in two contrasting environments. *S. Afr. J. Anim. Sci.* 16, 209-214

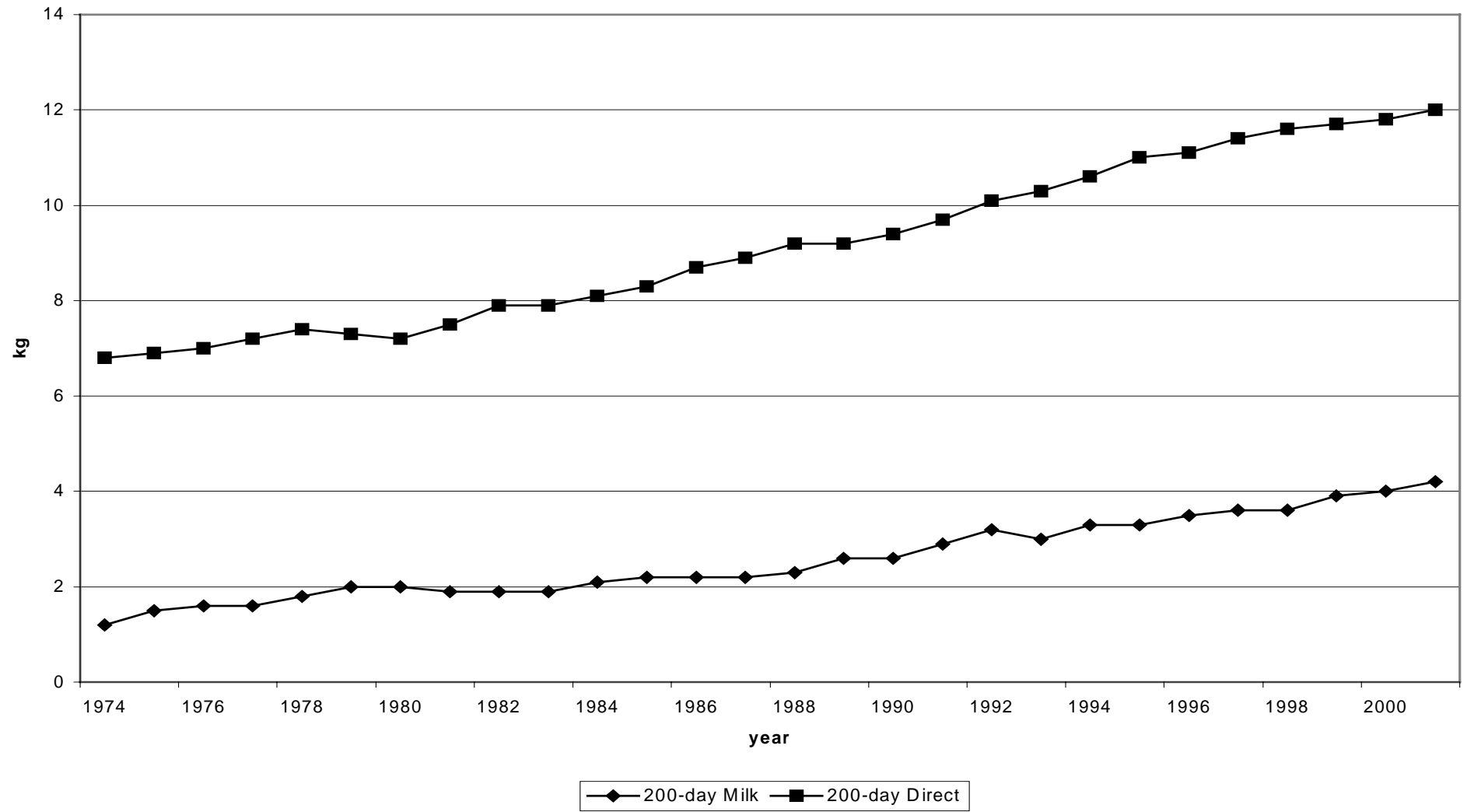


- VAN ZYL, J.G.E., SCHOEMAN, S.J. & COERTZE, R.J., 1992a.** Sire breed and breed genotype of dam effects in crossbreeding beef cattle in the subtropics. 1. Birth and weaning mass of calves. *S. Afr. J. Anim. Sci.* 22, 161-165
- VAN ZYL, J.G.E., SCHOEMAN, S.J. & COERTZE, R.J., 1992b.** Sire breed and breed genotype of dam effects in crossbreeding beef cattle in the subtropics. 2. Caving interval and cow productivity. *S. Afr. J. Anim. Sci.* 22, 166-169

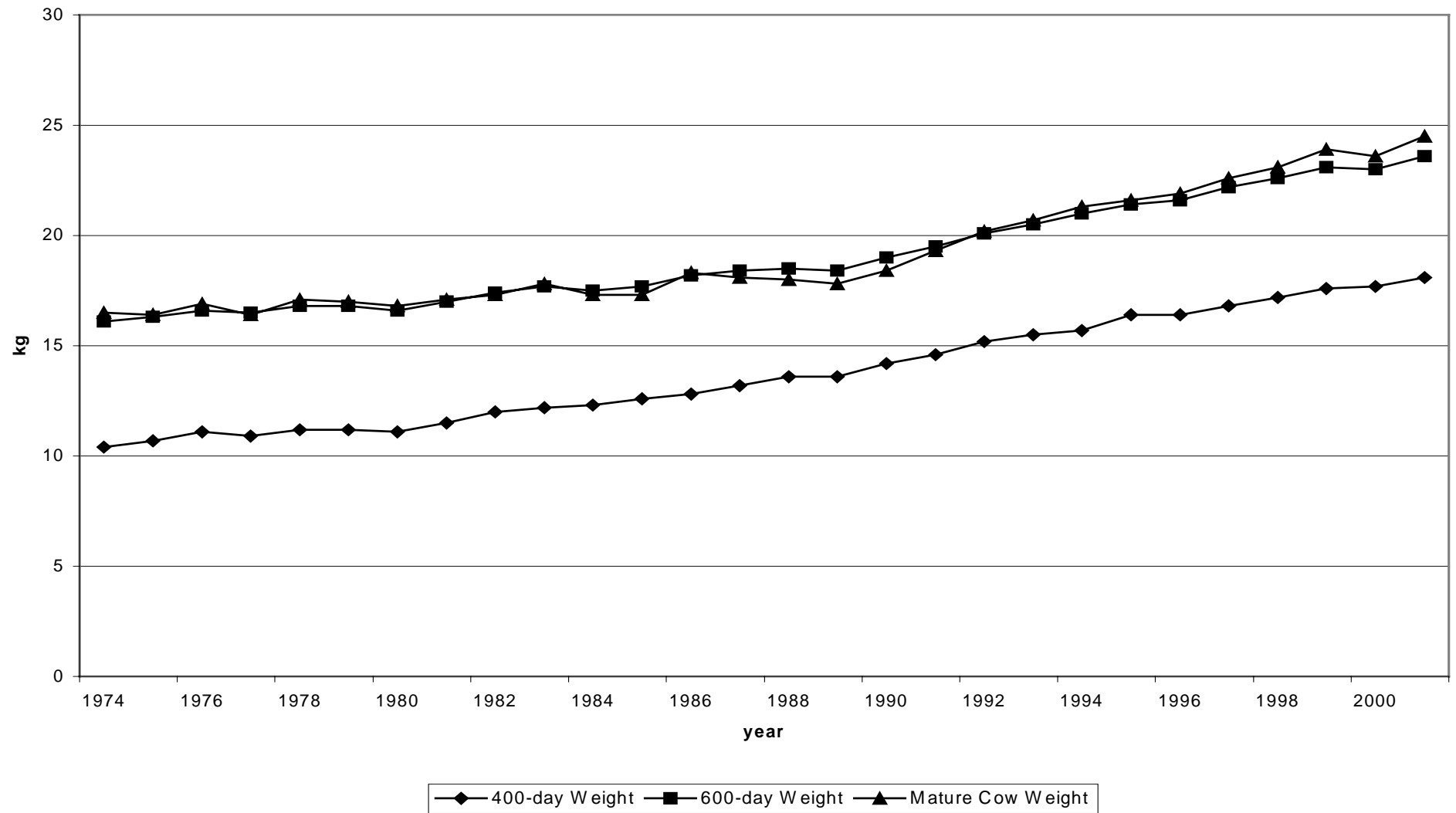




**Figure 1: Genetic trend for birth weight**



**Figure 2: Genetic trend for 200 day weight**



**Figure 3: The genetic trend for 400-,600- and mature cow weight**