EVALUATION OF VARIOUS WEANING STRATEGIES: A 7-MONTH VERSUS A 13-MONTH WEANING SYSTEM

A PRELIMINARY REPORT

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ABSTRACT

The effect of two different weaning strategies, 7-month versus 13-months, were evaluated in terms of reproduction, post-weaning growth, carcass weight and grades at different ages and kg calf/cow/year produced, in an Afrikaner and a Santa Gertrudis herd. Only multisire pure breeding were used. The Afrikaner herd had a higher calving percentage, lower birth mass and weaning mass than the Santa Gertrudis. At 18- and 28-months of age there was no significant difference (P>0,05) in live mass, or carcass mass, with-in breed, between the systems. Cows in the 7-month weaning system had a higher production/cow/year.

INTRODUCTION

Productivity of the cowherd is measured by two aspects, namely calving percentage and weaning weight. Production is then calculated as follows: Calving % x weaning weight = kgcalf/cow/year. A cow's production is influenced by a number of factors eg., her condition and the management practices used. The striving is that a cow should calf annually and wean a calf of 45-55% of her body weight, at the time of weaning.

Normally the conception rate of heifers and dry cows does not pose a problem, because they are sexually active, unless they are in bad condition or too fat. Cows that have just calved, do pose a problem because they are in a state of post partum anoestrus, the length of which is dependant of:

- the nutritional status of the cow,
- suckling,
- type of birth.

Thus it may happen that problems occur with cows which have to conceive again.

It is general knowledge that under extensive conditions, calves weaned at 7-8 months of age show very little weight gain after weaning, even though they have the genetic growth potential. If the calf is allowed to suckle too long, such cows have problems conceiving again.

From the above mentioned it can be seen that the traditional weaner production system does have a few problems.

IS THERE AN ALTERNATIVE?

A system which eliminates above mentioned problems and that is easily implemented, has been examined. It is a system where the cows are not mated during the normal breeding season, but ± 6 months later and the calves are weaned at 13 months of age. This means that each cow produces 2 calves in 3 years, because she calves every 18 months.

Theoretically it is a production system that should produce good results because:

- Cows are bred when they are "all" sexually active, and
- a cow is physiologically able to suckle a calf untill it is 13 months of age, unless she conceives shortly after calving.

As long as a cow is lactating, she is productive, and if she suckles a calf, she ensures that the calf will be able to maintain itself after weaning.

Mentz (1984) has the following to say about this system:

Average reconception % : 97%
Average weaning weight : 320 kg

kg calf weight produced/cow/year

$$= \frac{320kg \times ,97 \times 2\ calves}{3\ years}$$

$$= 206,9 \text{ kg calf weight/cow/year}$$

To equal this production with the traditional system, a herd must produce as follows or better:

$$\frac{225kg \times ,92 \times 3\ calves}{3\ years}$$

$$= 207 \text{ kg calf weight/cow/year}$$

Mentz(1984) indicates the following additional advantages:

- Calves that wean 320kg at 13-months, should yield a 220kg A3 or A2 carcass at 24-months of age.
- Less bulls are needed.
- Selection in the cow herd is easier due to more time available for selection(longer time span)
- With-in the system replacement heifers can be bred at 20 months of age.

MATERIALS AND METHODS

Data were collected at Sonop Research Station, (19˚20`S, 18˚55`E) 118 km north-east of Grootfontein (Namibia), from 1985 untill 1993. The station is situated in the Forest Savanna and Woodlands (Giess,1970).

ANIMALS

Two grade beef herds, an Afrikaner and a Santa Gertrudis herd were used, 60 cows per breed, 30 each in a control and an experimental group. At the beginning the cows of

both breeds were devided into age groups and then randomly allocated to the control and experimental groups, per age group, thus elliminating the possibility of age effects between groups with-in breeds. Multiple sire pure breeding was done and 12% of the cows were replaced annually. Criteria for replacement were: death, age (condition of teeth), injury, failure to conceive twice and weaning performance of progeny. The top 20% of the heifers were selected as replacements on the basis of conformation and post-weaning gain, and bred at the age of 24-months. Bulls were evaluated for breeding soundness prior to the breeding season, this included mating prowness and semen evaluation (when a veterinary surgeon was available). Breeding seasons were as follows:

Control herds:

Breeding season	:	Jan - March
Calving season	:	Oct - Dec of the same year
Weaning	:	May - July of the next year

Experimental herds:

Breeding Season	Calving Season	Weaning
Jan - March '85	Oct - Dec '85	Dec - Febr '86/87
Aug - Sept '86	May - July '87	July - Aug '88
Jan - March '88	Oct - Dec '88	Dec - Febr '89/90
Aug - Sept '89	May - July '90	July - Aug '91

The control herd is the traditional 12-month system where cows calf every year, and the experimental herd is the herd where the cows are mated every 18-months. The bulling rate was 1 bull/30 cows. To minimize bull effects, bulls were changed halfway through the breeding season and replaced every two years.

Management

Controlled selective grazing was practiced, in such a way that no treatment was favoured. The cows of each breed grazed together, except during the breeding season. As soon as the calves of the two control groups were weaned at 7-months of age, they were placed in a group together. When the calves of the experimental groups were weaned they were placed with the other calves. They then remained together untill marketing, thus no group is favoured. At 18-months of age, before marketing, 20% replacement heifers were selected for each breed, equally from each treatment. There-after all the oxen were randomly allocated to marketing at 18- or 27-months of age.

Data recording

The following data was recorded:
1. Conception rates of the different cow groups
2. Date of birth
3. Sex of calf
4. Birth weight

5. Weaning weight
6. Post weaning growth of the calves
7. Kg calf/cow/year
8. Carcass weight and grading
9. Gross and nett income
10. Weight changes of the cows: before and after the breeding season, after partutition and after weaning.

RESULTS AND DISCUSSION

For the discussion of the results the control groups will be refered to as System A and the experimental groups as System B.

Calving percentages

Cow Herds

Throughout the project a 77-day breeding season was used. Marked differences occurred with-in systems and breeds (Table 1a + 1b).

TABLE 1A : CONTROL GROUPS.

Breed	1985	1986	1987	1988	1989	1990	Breed av.	Sys av.
Afrikaner	79,3	76,6	84,8	83,3	68,8	73,3	77,68	75,58
Santa Gertrudis	81,4	81,4	75,0	71,4	71,4	60,0	73,4	
Average	80,4	79,0	79,9	77,4	70,1	66,6		

TABLE 1B : EXPERIMENTAL GROUPS.

Breed	1985	1987	1988	1990	Breed av.	Sys. av.
Afrikaner	86,6	76,9	82	88,46	83,49	77,12
Santa Gertrudis	65,5	63,6	80	74,19	70,75	
Average	76,1	70,3	81	81,33		

The low calving percentage of the Afrikaner cows of the control group in 1989 and 1990 can be attributed to a bull fertility problem which exsisted.

Although breed differences did occur with-in systems, the difference between systems was not significant ($P>0,05$), especially when compared to the advantages propagated by Mentz (1984).

The reason for the lower performance of the Santa Gertrudis can be attributed to their adaptability. Being larger framed animals they had trouble maintaining body weight, especially after parturition and during the long dry season. In System B many of the cows tended to become overfat and then did not conceive. This is due to the fact that they were mated every 18 months. This meant that instead of being mated while gaining weight, as in the normal system, they were mated after they had completed gaining weight.

Heifers

TABLE 2A : CALVING PERCENTAGES OF THE HEIFERS.

BREED	Mated	1985 Calved	Calving %	Mated	1986 Calved	Calving %	Mated	1987 Calved	Calving %
Afrikaner	5	5	100	26	3	11,5	23	6	26
Santa Gertrudis	6	5	83,3	20	6	30,0	15	5	33,3

During 1985 and 1986 the heifers were mared at 15-months of age, and during 1987 at 18-months of age.

TABLE 2B: CALVING PERCENTAGE OF HEIFERS MATED AT 18-MONTHS OF AGE.

BREED	1988 Mated	Calved	%	BM kg	1989 Mated	Calved	%	BM kg	1990 Mated	Calved	%	BM kg
A												
Afrikaner	9	1	11,1	31	9	0	0	00	11	4	36,4	31
Santa Gertrudis	5	1	20,0	32	11	2	18,2	32	11	4	36,4	31
B												
Afrikaner	10	2	20,0	29	14	11	78,6	31				
Santa Gertrudis	14	5	35,7	35	7	2	28,6	32				

In all instances a breeding season of 35-days was used. As can be seen the best results were obtained during 1985. Generally the results of this early mating of heifers were unsatisfactory. A possible reason could be that for early mating to be successfull, the grazing has to be excellent in this very extensive region, otherwise the heifers do not reach the minimum weight. It further shows that the Afrikaner is a late maturing type (sexually), therefore their lower calving percentages, except in a good year when they excell.

The cause of the low calving percentage for the Afrikaner group of system A, was a bull that had a problem which hadn't been noticed.

Due to these results obtained during this phase of the project it was decided that in the new project which will follow, the heifers will be mated at 24-months of age.

Birth masses

Birth mass of beef calves is important due to its association with dystocia and subsequent reduction of productivity(Brinks et al.,1973; Mentz et al.,1975; Smith et al.,1988). The birth of a strong, healthy calf is the single most important factor influencing efficient beef production. Eventhough the Santa Gertrudis is generally known as a breed with a low birth mass, the birth mass of the Afrikaner calves were heavier than that of the Santa Gertrudis only during 1988 and 1990(System B) and 1990(System A),(Tables 3a + 3b).

TABLE 3A : THE BIRTH WEIGHTS OF SYSTEM A.

BREED

YEAR	Afrikaner M	F	Santa Gertrudis M	F
1985	30,14	30,66	34,80	34,60
1986	31,10	31,70	34,40	35,60
1987	28,20	29,50	31,10	34,10
1988	38,00	29,00	35,00	32,00
1989	36,00	35,00	37,00	35,00
1990	33,50	29,86	31,60	29,78
Breed	32,80	30,95	33,98	33,51
average	31,88		33,74	(32,81)

TABLE 3B : THE BIRTHWEIGHTS OF SYSTEM B.

BREED

YEAR	Afrikaner M	F	Santa Gertrudis M	F
1985	32,60	31,24	35,29	33,38
1987	32,20	31,30	36,00	36,00
1988	36,00	34,00	32,00	32,00
1990	38,44	34,79	36,56	33,43
Breed	34,81	32,83	34,96	33,70
average	33,82		34,33	(34,08)

Birth weights of the System B calves were 3% heavier than those of System A. The fact that the birth weights of the heifers were heavier than the bull calves (system A ,1987), can be attributed to the fact that there were more heifers than bull calves. The effect of year (nutrition) can be seen in the fluctuation of the birth weights between years. The heavier birth masses of the calves from System B can be attributed to the forced longer ICP of System B, and thus more body reserves.

Weaning masses

Weaning mass influences the overall efficiency of beef cattle production (Harwin et al.,1966) and is a reliable indicator of beef cow efficiency (Venter et al.,1980). Together with calving percentage it forms the two most important factors influencing the productivity of the enterprise. In both Systems the Santa Gertrudis produced heavier weaners (P<0,05) than the Afrikaners (Tables 4a + 4b).

TABLE 4A : THE WEANING MASSES OF THE CALVES OF SYSTEM A.

YEAR	BREED Afrikaner M	F	Santa Gertrudis M	F
1985	191,70	169,20	228,00	211,40
1986	183,30	163,20	232,60	70,80
1987	171,60	173,10	226,50	217,90
1988	184,00	181,00	212,00	204,00
1989	192,00	170,00	207,00	212,00
1990	187,30	171,60	210,70	185,60
Breed	184,98	171,35	219,47	200,28
average	178,20		209,90	(194,05)

TABLE 4B : THE WEANING MASSES OF THE CALVES OF SYSTEM B.

Year	BREED			
	Afrikaner		Santa Gertrudis	
	M	F	M	F
1986	266,00	265,30	341,00	290,70
1988	285,00	279,00	299,00	294,00
1989	245,00	222,00	280,00	266,00
1991	251,00	239,00	290,50	269,30
Breed	265,33	255,43	306,67	283,57
Average	258,85		295,1 (276,98)	

Large differences with-in breeds, between systems occurred. Whether these differences are large enough to justify the 13-month weaner system will be shown later.

Post weaning growth of calves

TABLE 5A : POST WEANING GROWTH OF SYSTEM A.

Years	Afrikaner					
	12-months		18-months		24-months	
	M	F	M	F	M	F
1987	242,4	230,3	306,0	313,0	320,0	3010
1988	205,8	193,4	323,9	302,9	321,3	324,0
1989	212,0	190,0	325,0	308,0	—	—
1990	205,1	164,0	286,6	272,9	—	—
Average	216,3	194,4	310,4	299,2	320,7	312,5

	Santa Gertrudis					
1987	288,5	228,7	363,6	304,7	371,3	323,0
1988	259,6	243,1	404,8	368,6	398,8	390,2
1989	259,0	226,0	357,0	389,0	—	—
1990	255,7	184,9	307,5	303,2	—	—
Average	265,7	220,7	358,1	341,4	385,1	356,6

TABLE 5B : POST WEANING GROWTH OF SYSTEM B.

Years	Afrikaner					
	12-months		18-months		24-months	
	M	F	M	F	M	F
1987	266,0	265,3	302,2	339,4	311,1	337,2
1988	277,6	243,8	269,5	249,0	311,1	329,3
1989	233,0	288,0	267,0	276,0	—	—
Average	258,9	265,7	279,6	288,1	311,1	333,3

	Santa Gertrudis					
1987	341,0	290,7	405,0	355,7	376,0	344,3
1988	290,0	295,4	309,3	294,4	298,0	336,3
1989	264,0	253,0	323,0	315,0	—	—
Average	298,3	279,7	345,8	321,8	337,0	340,3

During 1989 the weighing of animals at 24-months of age was stopped. The reason for the heifers being heavier than the oxen at 24-months, especially in system B is that they have been mated at 18-months and thus are approximately 4 - 6 months pregnant. From Tables 5a and 5b it can be seen that the advantage within system B, calves had at 12-months of age, due to their longer suckling period, had been cancelled by compensatory growth at the age of 18 - 24-months, by the calves of System A. Calves born from a winter mating season weaned heavier than those of a summer mating season, their 18-month mass and 24-month mass were lower than those born to a summer mating season.

Kg calf mass produced/cow/year

Production is calculated as follows:

System A: Weaning mass x weaning % x 3 calves / 3 years
System B: Weaning mass x weaning % x 2 calves / 3 years
(see Tables 6a + 6b).

TABLE 6A : SYSTEM A FOR 1986 – 1990.

1985	=	200.075 x 0,804
	=	160,86kg/cow/year
1986	=	187,475 x 0,79
	=	148,105kg/cow/year
1987	=	197,275 x 0,797
	=	157,228kg/cow/year
		Average = 146,65kg/cow/year
1988	=	195,255 x 0,774
	=	151,124kg/cow/year
1989	=	195,255 x 0,701
	=	136,87kg/cow/year
1990	=	188,8 x 0,666
	=	125,74kg/cow/year

TABLE 6B : SYSTEM B FOR 1985 – 1990.

1985	=	290,75 x 0,761 x 0,66
	=	147,51kg/cow/year
1987	=	287,0 x 0,703 x 0,66
	=	133,16kg/cow/year
		Average= 139,13kg/cow/year
1988	=	253,25 x 0,81 x 0,66
	=	135,39kg/cow/year
1990	=	262,44 x 0,8133 x 0,66
	=	140,87kg/cow/year

Eventhough the hypothesis held up by Mentz (1984) stated that system B should produce more meat than system A, this could not be proven during this period. The big problem experienced was that the cows tended to want to calf every year, and when one interferes with that, problems arise with animals that either calf out of season (bull or cow jumped the fence), or she becomes totally unproductive due to hormonal disturbances and over fatness.

Grades and prices of slaughtered animals

Slaughter data of oxen slaughtered at 13-, 18-, and 28-months of age

TABLE 7A: 13-MONTH WEANERS FROM SYSTEM B.

	1986		1988		1990	
	Afr	San	Afr	San	Afr	San
Live mass	293	342	290	326	282	304
Cold mass	146,8	181,2	138	168	127	147
Slaughtering percentage	50,1	52,9	48	51	45,1	48,4
Grading	6A1	1SA	2A1	1SA	4A3	1A3
aa	2A3	4A1	1A3	1A1		
Gross Income	509,08	648,69	679,00	841,00	587,94	704,13
Nett Income	453,99	593,60	—	—	320,72	436,91
Number	8	5	3	2	4	1

TABLE 7B: 18-MONTH STEERS: SYSTEM A.

Afrikaners				
	1987	1988	1989	1990
Live mass	333,5	339	333	292,4
Cold mass	159,0	157,0	155,0	134,3
Slaughtering %	47,6	46,0	47,0	46,0
Grading	2A1	4A1 / 3A3	1A1 / 5A3	4A3
Gross Income	662,24	762,00	768,00	522,84
Nett Income	466,98	—	—	255,38
Number	2	7	6	4

Santa Gertrudis				
Live mass	389,5	398	387	309,5
Cold mass	188,0	194,0	183,0	144,0
Slaughtering %	48,2	49	47	46,7
Grading	4A1	4A3	1A1 / 3A3	2A3
Gross Income	770,80	920,00	902,00	603,36
Nett Income	574,04	—	—	335,90
Number	4	4	4	2

TALE 7C : 18-MONTH STEERS: SYSTEM B.

Afrikaners				
	1987	1988	1989	1990
Live mass	321	309	373	292
Cold mass	151,6	142	177	131,3
Slaughtering %	47,2	46	48	46,7
Grading	3A1	3A3	3B3	4A3
Gross Income	629,30	652,00	783,00	509,84
Number	3	3	3	4

Santa Gertrudis				
Live mass	—	278	417	355
Cold mass	—	125	204	163,5
Slaughtering %	—	45	49	46,05
Grading	—	2A3	1B1 / 3B3	2A3
Gross Income	—	579,00	921,00	685,07
Nett Income	—	—	—	417,61
Number	0	2	4	2

TABLE 7D : 28-MONTH STEERS: SYSTEM A.

Afrikaners			
	1988	1989	1990
Live mass	427	355	394,7
Cold mass	209	171	188,6
Slaughtering %	49	48	47,8
Grading	4PB/3B1	4B3	2B3/1B1
Gross Income	999,00	751,00	750,27
Nett Income	—	—	482,81
Number	7	4	3

Santa Gertrudis			
Live mass	530	455	407,0
Cold mass	270	232	194,6
Slaughtering %	51	51	48
Grading	3PB/1B1/1C1	1B1	3B3
Gross Income	1198,00	1097,00	743,63
Nett Income	—	—	476,16
Number	5	1	3

TABEL 7E: 28-MONTH STEERS: SYSTEM B.

Afrikaners			
	1988	1989	1990
Live mass	425	373	433
Cold mass	207	177	213
Slaughtering %	49	48	49,3
Grading	2PB/6B1/1B3	3B3	2B3
Gross Income	977,00	783,00	815,57
Nett Income	-	-	-
Number	9	3	2

Santa Gertrudis			
Live mass	455	417	—
Cold mass	220	204	—
Slaughtering %	49	49	—
Grading	2PB	1B1/3B3	—
Gross Income	1051,00	921,00	—
Number	3	4	0

Slaughter masses for the breeds did not differ very much between systems at 18- and 28-months of age (Tables 7b, 7c, 7d, 7e).

Slaughtering from the veld at 18-months of age, did not produce good results. The animals were still growing, and thus fat deponition had not commenced, therefore most of the carcasses were A0 and a few A1's. Eventhough the carcasses of the Afrikaner oxen weighed less than the Santa Gertrudis oxen, their total gross and nett income were higher, thus proving that heavier calves cannot beat good reproduction. Had the Santas been able to reproduce as well as the Afrikaner, the picture would have been different. Thus the last word in production still remains adaptibility to the environment and high fertility.

From the grading results of both breeds it can be seen that it is not advisable to market animals before 28-months of age, except in a very good year, due to the fact that they have not yet reached the correct fatness, they are still growing(depositing muscle) and not yet depositing fat.

Changes in cow masses from 1985 - 1990

The effect of rainfall/grazing on the cow masses can be seen in Tables 8a & b. Both breeds in both Systems showed the same tendencies, but the differences between mass at parturition and mass at weaning were much smaller in System B than in System A. This could be due to the longer period between calving and weaning and weaning and the next calving. On average the Afrikaner cows of System B were heavier than those of System A at the beginning of the breeding season and after parturition, but lighter at weaning, the latter could be due to the longer period of suckling.

TABLE 8A: CHANGES IN COW MASSES FROM 1985 TILL 1990: SYSTEM A.

	Before Br.Sea.	After Br.Sea.	After Part.	After Weaning
Afrikaners				
1985	361,53	406,87	395,22	453,00
1986	391,58	439,13	433,55	446,52
1987	413,45	436,40	363,13	470,44
1988	359,57	411,63	384,09	458,65
1989	350,65	427,00	388,76	453,12
1990	393,47	441,97	370,73	452,00
Average	381,37	427,17	389,25	456,35
Santa Gertrudis				
1985	411,25	461,52	415,45	491,00
1986	410,83	458,68	377,36	476,71
1987	439,59	462,00	371,19	485,20
1988	405,30	448,78	387,11	463,53
1989	374,90	465,70	405,60	483,66
1990	428,62	472,00	393,30	495,00
Average	411,75	461,45	408,34	480,02

TABLE 8B : CHANGES IN COW MASSES FROM 1985 TILL 1990: SYSTEM B.

Afrikaners				
1985	397,45	422,67	373,50	413,50
1986	—	—	408,67	471,14
1988	371,69	424,28	384,42	402,86
1989	446,29	436,29	486,16	479,00
Average	405,14	427,75	413,19	429,17
Santa Gertrudis				
1985	420,61	484,50	410,31	460,16
1986	—	—	486,78	503,18
1988	371,10	424,42	388,35	402,00
1989	446,94	439,78	503,11	483,00
Average	412,88	449,57	447,14	455,15

The difference in weights between the two systems can be attributed directly to the systems used. The animals of system B had more time to restore body reserves and thus gained weight easier than the animals of system A.

From the above tables a few tendencies can be seen:

* For both breeds and both systems the same tendencies in weight changes were found.

* That between years differences did occur.
* That on average the Afrikaner cows of system B were heavier than those of system A.

* No significant differences between the Santa Gertrudis cows of the different systems.

* In the case of system B there was a difference in the weight changes between the years with summer breeding seasons and those with winter breeding seasons.

CONCLUSION

Under extremely extensive farming conditions adapted breeds produce better than less adapted breeds. Significant differences occurred between years. No significant differences were found with-in breed, between systems, for slaughtering masses of the two breeds at 18- and 28-months of age. Thus the weaning of calves at 13-months of age did not have an advantage on slaughtering mass, eventhough they weighed heavier at 13-months of age than those weaned at 7-months of age, at 13-months.

Thus, eventhough in theory the weaning of calves at 13-months of age should produce better, in practice it did not realize, for the calves weaned at 7-months of age showed compensatory growth, which cancelled the advantage that the calves weaned at 13-months, had at weaning.

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