قسم : التوليد والتلقيح الصناعي .
كلية : الطب البيطرى - جامعة أسيوط .
رئيس القسم : أ . د . / محمود عبد المحسن النجار .

تربية الجاموس في صحراء الوادى الجديد - بمصر

(نموذج التكاثر والانتاج)

ممدوح عثمان

- كانت أول محاولة لتربية الجاموس في الصحراء بناء على معدلات التكاثر وانتاج اللبن في الفترة من ١٩٧٤ وحتى ١٩٨٣ في واحة الخارجة بمحافظة الوادى الجديد بمصر وذلك باستخدام التلقيح الطبيعي ، الا أنه أدى الى ضعف الخصوبه وزيادة نسبة النفوق في العجول .
- واعتبارا من ١٩٨١ وبصفة دورية تم اجراء الفحص التناسلي والطبي للتغلب على تلك المشاكل ، وأسفر الفحص الاكلينيكي لطلائق الجاموس المستخدمة عن تمتعها بحالة طبيعية في كل من الأعضاء التناسلية والسائل المنوى .

وقد ارتفعت نسبة الحمل بعد المتابعة والفحص الدورى من ٥٠ر٢ ٪ الى ٧٨ر٦ ٪ ، بينما انخفضت نسبة النفوق بين العجول من ١٩ر٢٪ الى ١ر٥ ٪ ، كذلك انخفض العمر عند أول ولادة والفترة بين ولادتين من ٤٩ شهرا الى ٤٤ شهر ، ٥٨٢ يوما الى ٤٧٢ يوما بالترتيب .

وقد أمكن الحد من حالات خمول المبايض والتهاب الرحم المزمن باستخدام ثنائي فوسفات الصوديوم وب . ن . ف .

وارتفع معدل انتاج اللبن اليومي من ١ره الى ٥ره كيلوجرام ، مما أدى الى ارتفاع الانتاج خلال موسم الحليب من ٦ر٤٥٦ الى ٥ر١٩٧٠ كيلو جرام .

وبالمتابعة أيضا بلغ الطلوقة من العمر ١١ عاما ولا يزال نشطا جنسيا، كذلك بلغت أكبر جاموسة ١٣ عاما وهي عشار وقد أعطت ٦ ولادات سابقة .

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BREEDING BUFFALOES IN THE NEW VALLEY DESERT AREA OF EGYPT (PATTERN OF REPRODUCTION AND PRODUCTION)

(With 7 Tables)

By
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SUMMARY

As a first successful trial to breed buffaloes in the desert, the pattern of reproduction and milk production was investigated in a local farm, from 1974 - 1983, at El-Kharga oasis of the New Valley Governorate of Egypt. Natural breeding was practiced but the farm complained from low fertility and high incidence of calf mortality. Routine gynaecological and medical care was applied after 1981 to resolve both problems. The clinical examination of the 2 breeding buffalo bulls revealed their normal enitalia and semen picture. After care the incidence of pregnancy increased from 50.2% to 78.6% while the calf mortality decreased from 19.2% to 1.5%. The age of first calving and the calvin intervals decreased from 49 to 44 months and from 582 to 472 days respectively. The first calvin interval was the shortest among consecutive calvings (442 days). The incidence of ovarian inactivity and chronic endometeritis was 1.3% and 14.3% respectively. Dibasic sodium phosphate and P.N.F. gave good results for the treatment of both conditions respectively.

The total milk yield increased gradually till the 4th lactation (1864 kg) while the lactation length reached its maximum average value at the 5th lactation (311 days). After care the milk yield per day and per 305 days increased from 5.1 to 5.5 kg and from 1564.6 to 1970.5 kg respectively. The maximum daily milk yield reached 14 kg in few individuals.

The weight of male and female calves at birth averaged 32.0 and 31.5 kg respectively. The calculated gain in live weight for growing males averaged 0.56, 0.45 and 0.34 kg till the age of 2, 2.5 and 3 years respectively. The adult male and female buffaloes weighed 620 and 594 kg in average respectively. The elder bull aged 11 years and still active while the elder cows aged 13 years 6 months with 6 previous calving and still pregnant.

INTRODUCTION

It is generally accepted that water buffloes were introduced to Egypt from India through Iraq after the Arab invasion about the middle of the seventh century. The established themselves quickly in the favourable environment of the River-Nile Valley to become now the most important animals in the country (2.4 million in recent population). About 63% of Egyptian buffaloes are in low Egypt, 20% in Middle Egypt and 17% in Upper Egypt (SIDKY, 1951).

ASKER, RAGAB and GHANY (1953) measured the heat tolerance of buffloes to be much less than that of Shorthorn and Egyptian Cattle. Moreover, BADRELDIN and GHANY (1952) and TANEJA and BHATNAGAR (1960) advised to try to keep buffaloes cool by the application of water, sprayin or wallowin especially in hot weather or sun. MACGREGOR (1939) cited that buffaloes are found under their usual hapitate in river valleys, wet cultivation, thick forest, islands, marshy areas, swamps, savannah, bush and rainy wet places. The review of MASON (1974) denotes that water buffaloes have not yet live in desert areas.

HASSAN (1982) mentioned that the first importations of buffaloes to the Western Desert of Egypt (Elkharga of the New Valley Province) occured in 1959 with farmers migrated from Upper Egypt through the General Desert Development Organization. The exact numbers of buffloes at that time were unknown. In recent report from Elkharga Veterinary Service (1983), the population of buffloes reached 1000 compred to 21,000 native Cattle. The aim of the present work is to study the patern of reproduction and milk production in Water Buffaloes bred in a local Governmental farm in the dry Western desert area of Egypt (Elkharga oasis of the New Valley Governorate).

MATERIAL and METHODS

In 1974, the Governarate of the New Valley Province brought 8 Behari buffaloes from Sacha, Kafrelshikh Province at Loer Egypt, for breeding in a local farm at Elkharga. The exact birth dates of these animals were unknown and they were supposed to be pregnant. Two buffalo bulls came to the farm from the same place. One year later, 10 buffalo cows purchased from the neighbour farmers were added to the farm. All animals were T.B. and Brucella free and sprayed against ectoparasites periodically through a local Veterinary Service. Hand milking occurs twice daily and natural breeding ws practiced.

The Farm administration complained from low fertility and high mortality of the newly-born calves. In MARCH, 1981, a scheme was suggested to resolve both problems, since breeding in fact was almost haphazard. As this was the first trial to breed buffaloes in the desert, the daily air temperatures and humidity were obtained from the Weather observatory Centre at Elkharga. The work in the farm was performed as follow:

Buffalo bulls :

Thorough andrological examinations including semen evaluation were made after OSMAN (1965) and LAING (1979). Each one of the bulls runs reciprocally with the herd during the day.

Bufalo cows :

Thorough gynaecological examinations were made monthly (as possible) after EL-WISHY (1965). Gynaecological sheets were used to record the reproductive conditions of the animals at each examination. According to the examinations, the buffaloes were divided into pregnant and non pregnant (cyclic and acyclic) groups. Dibasic Sodium Phosphate (20 g daily for two weeks mixed with the ration) was used to treat cases with ovarian inactivity. PNF (precaine penicillin G, Neomycine sulphate, 5-nitro-Furoldehyde semicurazone) with prednizolone (Marck, Sharp and Dohme, München, Germany) was used to treat chronic endometritis after ABDELLAH (1980).

BREEDING BUFFALOES

Newborn Calves :

These were allowed to feed the colostrum immediately after calving and for 3-4 days. In a suitable room with clean rice straw bedding, the calves stayed most of their times. They were allowed to fed their mother's milk 2-3 times daily either by nursing or by hand feeding. They were fed about 6 - 10% of their live weights milk during the 2 - 3 months weaning period (MOHAMED, 1980). The calves were then, fed long hay and gradually turned to the normal ration. During this critical period of their life, the calves stayed few hours daily in the sun or under shade according to the hottness of the weather.

Milk production :

The milk yield of the lactating cows was calculated per day, per lactating season and per 305 days before and after 1981 (the time of our observation to the farm). Cows gave less than 5 kg milk per day were discarded from the farm when possible.

Herd records :

The data collected were from 1974 to 1983. The number of alive and discarded buffaloes were taken annually. Pregnancy rate, caling rate and the incidence of calf mortality and dystocia were analysed. The live weights of male and female newly born calves and adul buffaloes at different ages were given. The age of puberty for females born in the farm was calculated from the age of first calving after deduction of 312 days epected pregnancy period before and after 1981. Calvings intervals were calculated for certain individuals till the fifth consecutive calvings. The breeding life as correlated to the number of calvings was obtained for elder buffaloes.

Management :

This includes stable, feeding, grazing and breeding.

Stable :

The situation of the stable is suitable for good ventillie on dust or mud and rarely on rice straw. Removal of the manure performed daily at time of grazing.

Feeding :

Concentrate mixture, contains 35% decorticated cotton seed cake, 33% wheat bran, 22% maize, 4% rice polish, 3% molasses, 2% limestone and 1% salts, offered to the animals in the following amounts: Milking Buffalo Cows 6 kg; Pregnant Buffalo Cows 4 kg; Heifers and non-pregnant buffalo cows 3 kg. Wheat straw was added when available from 3 to 5 kg per animals. The concentrate mixture contains: 15% crude protein, 50.1% carbohydrate, 12.2% crude fibres and 4% fat according to MORRISON (1959).

Grazing :

Daily grazing for the buffaloes was advised from 8 a.m. to 13 p.m in Winter and from 7 a.m to 10 or 11 a.m in Summer acording to the hottness of the weather. Grazing occured on Hegazi and or Meskaw barseem most of the year. The animals stayed freely in the sun or under tree shade durin the grazing time.

Breeding :

To avoid high Summer mortality of the newly born buffalo calves, natural breeding ws allowed durin late winter and early Spring to expect calvings at late Autumn and during Winter.

RESULTS

An idea the seasonal variations in air temperatures and humidity of the Egyptian Wetern Desert can be taken from Table (1). There is non rain in the area and water comes from different wells.

The results of clinical examinations for the two buffaloe bulls in the farm are presented in Table 2, where biometry of the genitalia and semen picture were given.

The propagation of bufflo cows from 1974 to 1983 and some of their reproductive traits and calf mortality are summarized in Table (3). The buffalo cows brought from SACHA (1974) ere supposed to be pregnant, therefore the pregnancy rate at that year was high. Rectal examinations were not performed before 1981 and the pregnancy rate during that period was calculated from the records of calvings. The incidence of pregnancy increased from 50.2% to 78.6% after Gynaecological care. Moreover, calf mortality decreased from 19.2% to 1.5% (average values). The ratio between males and females newlyborn calves was 1 : 1.02 (total numbers).

Animals died in the farm were reported to be due to the following causes: reaction to cattle plague vaccination (3), enteritis (6), pneumonia (6), traumatic pericarditis (2), uterine torsion (3), tympany (1) and peritonitis (1).

The age of puberty and calving intervals showed much improvements after care (Table 4). Among consecutive calvings the first intervals was the shortst (Mean 442 days).

The results of gynaecological examinations (Table 5) showed an incidence of 14.3% ovarian inacvtivity which responded successfuly to dibasic sodium phosphate treatment (80%) than tonophosphan (57%). Chronic endometritis treated with P N F suspension gave good results (100%).

The milk production and lactation length as calculated before and after gynaecologicl care ad advice (1981) are shown in Table (6). The total milk yield increased gradually till the 4th lactations (1864 kg) while the lactation length reached its maximum average values at the 4th (300 days) and 5th (311 days) lactations. The average milk yield per day and per 305 days increased after care from 5.1 to 5.5 kg and from 1564.6 to 1670.5 kg respectively (total values).

It is of interest to mention that certain individuals reached a maximum value of 14 kg milk per day during the 3rd or 4th lactation season.

As shown from Table (6), the weights of male and female buffalo calves at birth were nearly similar (32.0 and 31.5 kg respectively). At 2, 2.5 and 3 years of age, the calculated gain in body weight of mature bufflo bulls averaged 0.56 $\pm$ 0.07 , 0.45 $\pm$ 0.04 and 0.34 $\pm$ 0.07 kg per day respectively. For elder buffalo bulls and cows the live weight reached an averae of 620 $\pm$ 36.1 and 594 $\pm$ 52.7 kg respectively.

From the records obtained for the first 18 imported buffalo cows in the farm, 13 were discarded at an average age of 7 years 9 months (range from 4 years 3 months to 11 years 2 monhs). The average number of calvings for these buffaoes ws 3.7 with a range from

2 - 6 calves per animal. The rest 5 buffaloes of this group still alive and pregnant. They varied in age between 10 years 4 month and 13 years 6 months and each one of them gave 6 previous calvings.

DISCUSSION

The breeding of buffaloes in the New Valley desert area of Egypt seems to be the first successful trial in this respect as it was conversely reported by COCKRILL (1974) that buffloes introduced into countries south of the Sahara in Africa during the past four centuries have invariably succumbed due to disease or mismanagement.

The fertility of buffalo bulls used for natural breeding in this area lies within the scope reported by OSMAN (1965) and WHYTE and MATHUR (1974). Moreover, the breeding life which extended beyond 11 years compared well with the average age of 8.7 years reported by EL-ITRIBY (1974) for Egyptian buffalo bulls.

After gynaecological care the pregnancy rate of the studied buffaloes reached an averae of 75.6% which is higher than 29%, 48.8% and 57.6% as reported by SCHMIDT, EL-SAWAF and GHARIB (1963), EL-WISHY (1965) and SHEHATA (1983) respectively. Culling of buffalo cows which were unsuitble for breeding increased the rate of pregnancy to 86.4% during the last year.

The includence of calf-mortality decreased from 36% (1980) to 0.7% (1982) after better management and hygienic housing of the farm. ASKER and EL-ITRIBY (1957) reported a mortality rate of 33% from birth up to 3 years of age in buffaloes. SHAHIEN, BARRADA and EL-ITRIBY(1967) reported higher figure (70.5%) from birth to 6 months of age. It is important to mentionthat regulating the time of natural breeding in this farm (March - May) avoid the occurrance of high Summer calf-mortality which was suggested by PAL (1952) to be simply heat stroke.

The age of puberty (mean about 33 months) as calculated from the age of first calving is more than 22.2 months recorded by ZAKI, SOLIMAN and RAMSEES (1963). However, the mean age at first calving which decreased after gynaecological care from 49 to 44 months appeared to be still higher than 38 months reported by ALIM (1957). Through suitable management better improvement could be achieved as certain individuals gave their first calvings at 33 months of age.

The mean calving-interval which decreased from 582 to 472 days seems to be the result of gynaecological care and follow up of the animals. On the other hand, KHISHIN (1951), ALIM and AHMED (1954) and ALIM (1978) reported different calving intervals between 452 and 650 days in buffaloes. Among consecutive calvings, the first calvin interval is the shortest and some individuals have 336 days calving interval with a minimum of 23 days for the first fertile postpartum estrus. EL-WISHY (1965) reported a wide range of 30 to 1266 days for the first postpartum conception in Egyptian buffaloes. Moreover, Mostageer, MORSY and SADEK (1981) mentioned that the first calving interval (538.2 days) was longer than any subsequent ntervals (419.1 - 430.0 days). To shorten the calving intervals in buffaloes, continuous gynaecological care should be practiced. ASHFAG and MASON (1954) cited that calving interval is almost entirely under the control of maagement and it could have little or no genetic component.

The reported incidence of overian inactivity of the studied farm (14.3%) is lower than 29%, 32% and 21.3% as reported by BAR (1963), LUKTUKE and SHARMA (1978) and FARRAG (1978) respectively. The successful use of PNF and dibasic sodium phosphate for the treatment of repeat breeder and ovarian inactivity is close to the findings of ABDELLAH (1981) and SHEHATA (1983) respectively.

The average milk yield (1534.7 kg) and lactation period (289.4 days) reported for buffalo cows in the New Valley farm appeared less than 2101 kg and 307 days (BEDEIR, 1965), 2217 kg and 325 days (EL-KIMORY, 1966) and 2025 kg and 311 days (ALIM, 1978) and much higher than 1267 kg and 186 days (RAGAB, 1945) and 1200 kg and 217 days (MOSTAGEER et al., 1981).

The first lactation milk yield obtained in this work (1347.7 kg) is very similar to 1362 kg recorded by SIDKY (1951) and both values are higher than 1100 kg (SHAHIEN, BARRADA and EL-ITRIBY, 1966), 990 kg (EL-FOULY and AFIFY, 1977) and 1000 kg (MOSTAGEER et al., 1981).

The milk yield per day (4.8 - 6.4 kg) lies within the scope of other Egyptian invesigators. Moreover, the negligable differences between total milk yield and milk yield per 305 days denote that mostbuffaloes produced milk for about 10 months.

The slight improvement in milk production after 1981 (1564.6 to 1670.5 kg/ 305 days) was acompanied by some decrese in the lactation period (293.9 to 284.9 days). This means that heritability of milk production and loctation period as cited by MASON (1974) should be considered beside management when scheme for increasing breeding efficiency is required in buffaloes. Moreover, SINHA and MINET (1947) and MISRA SENGUPTA and ROY (1963) succeeded to increase the daily milk yield by splashing or shwered the buffalo cows twice daily for 5 minutes during Summer.

In the studied farm there are few individuals reached a maximum daily yield of 14 kg with a total milk yield of about 3190 kg and a lactation period of aout 290 days. KHAN (1967) reported that where milking is carried out three times a day the daily yield reached 16 kg in a single case from a superior herd of buffalo in Pakistan. The available literature showed no further comparable figures. It seems passible that better improvement in buffalo breeding can be achieved if correct progeny is practiced from similar peculiar individuals.

The mean weight of buffalo calves at birth is nearly similar to those estimated by FAHMY (1972) and less than 39.0 kg reported by EL-KHESHIN (1948) and TANTAWY and AHMED (1955). The difference in mean weight between male and female at birth is less than 2 kg reported by MOSTAGEER et al. (1981).

The daily gain in live weight during the first 2 years of age (0.56 kg/days) is nearly similar to 0.61 kg and 0.5 kg reported by SHUTE (1966) for buffaloes at an average initial weights of 184 kg and for 20 weeks and KASSIR, McFETRIDGE and HENSEN (1969) for buffaloes aged 15 months respectively. BADRELDIN (1955) found that under good condition of feeding the average dily gain reached 0.86 kg in naturally suckled buffalo calves.

The daily gain in live weight of the studied animals which decreased markedly, after 2.5 and 3 years of age (0.45 kg and 0.34 kg respectively) denoted that buffaloes showed better fattening ability during the first two years of their life. Information on weight gain of mature buffaloes is limited in the literature. However, CUMBURIDZE and DALAKISHVILI (1959) and OGNIJANOVIC (1974) cited that if buffalo calves are well fed and managed they yield a meat which in quantity is not inferior to that of other bovine animals.

The buffalo cows which gave 6 calves and still pregnant in the farm coincide with the report of COCKRILL (1974) that female buffaloes become sterile after 7 - 8 calves at the ge of 14 - 16 years. ALIM (1953) and EL-ITRIBY (1974) cited that true figure for the longevity of Egyptian buffaloes on farms do not exist and they assume similar calving numbers under village condition.

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TABLE (1)

Seasonal variations in air temperature and humidity in the New Valley desert area of Egypt.

Seasons	Air Temperature C°		Humidity %	
	Maximum	Minimum	Maximum	Minimum
Spring	35.5±5.9 (25.5-43.5)	16.2±5.8 (8.8-26.1)	57.4±18.1 (22-97)	25.1±8.9 (11-47)
Summer	39.5±2.9 (34.8-46.4)	21.5±3.3 (15.2-29.8)	51.2±11.0 (24-71)	20.6±5.9 (9 - 37)
Autumn	27.8±4.7 (20.5-36.7)	10.2±5.6 (0.6-20.8)	73.7±9.9 (34 - 94)	35.2±7.1 (18 - 48)
Winter	21.9±4.2 (14.6-34.7)	2.8±3.4 (-2.6-14.8)	81.2±12.0 (51 - 99)	39.4±8.3 (20 - 58)

TABLE (2)

Results of the andrological examination and semen picture of the two breeding buffalo bulls in the New Valley Farm

Buffalo Bull No	Age (year)	Body weight (kg)	Testes size (c.cm)	Epididymis size (cm)		Seminal glands (cm)			Semen picture			
				caput Breadth	cauda Breadth	Length	Breadt	Thick-ness	Volume (ml)	Mass activity (+)	Individ motility (%)	Concentration 10^6/c.m m.
1	11	650	157.2	2.5	2.3	5.5	3.2	0.8	3.5-4.5	++	75	0.90
2	4	580	103.3	2.0	1.8	4.8	3.0	0.5	3.2-3.8	++	75	0.85

BREEDING BUFFALOES

TABLE (3)

Incidence of pregnancy, dystocia and calf mortality for buffalo in the New Valley farm before and after gynaecological care

Years		n buffaloes / year			Pregnant		Dystocia		Newlyborn Calves			calf Mortality		Discarded cows		
		Cows	Heifers	Total	n	%	n	%	♀	o+	Total	n	%	Died	Slaughtered	total
Before Gynaecological	1974	8	-	8	7	87.5	-	-	4	3	7	-	-	-	-	-
Care:	1975	10	8	18	10	55.6	-	-	6	4	10	2	20.0	-	-	-
	1976	14	10	24	12	50.0	-	-	6	6	12	1	3.3	-	-	-
	1977	24	12	36	19	52.7	-	-	7	12	19	3	15.8	-	-	-
	1978	28	16	44	22	50.0	-	-	13	9	22	4	18.2	-	-	-
	1979	28	30	58	23	41.1	1	4.3	12	11	23	5	21.8	2	7	9
	1980	32	18	50	25	52.1	2	8.0	8	17	25	9	36.0	3	-	3
After Gynaecological	1981	44	10	54	36	70.6	1	2.7	18	18	36	4	1.1	3	-	3
Care:	1982	44	12	56	36	70.6	1	2.4	22	19	41	3	0.7	5	-	5
	1983	51	18	69	38	86.4	-	-	20	18	38	1	2.6	9	16	25

N.B.: Pregnancy rate was calculated after deduction of the discarded buffaloes.

TABLE (4)

Age of puberty and calvings intervals for 6 consecutive calvings of buffloes in the New Valley farm before and after gynaecological care (1981)

	Age of Puberty		Calvings intervals for 6 consecutive calvinges (days)							
	Before 1981	After 1981	1st	2nd	3ed	4th	5th	Total (average)	Before 1981	After 1981
Mean	month 39	month 34	442	548	512	601	522	525	582	472
Minimum	31	23	336	352	392	393	392	336	341	336
Maximum	61	44	862	922	1179	971	766	858	1179	665
n	18	16	55	29	13	6	4	107	50	35

BREEDING BUFFALOES

TABLE (5)

Results of gynaecological examinations for buffaloes in the New Valley Farm

(1981 - 1983)

Total number of examinations	Pregnant		Diestrus		Estrus		inactive ovaries		chronic endometritis	
	n	%	n	%	n	%	n	%	n	%
238	180	75.6	17	7.1	4	1.7	34	14.3	3	1.3

TABLE (6)

Milk yield and Lactation periods for buffalo in the New Valley Farm

Lactations	Milk Yield (kg)	Lactation Period (days)	Milk Yield/ day (kg)	Milk Yield/ 305 days (kg)	n
1 st					
Before 1981	1372.6±335.9	283.0±22.7	4.8	1479.3	35
Affter 1981	1323.4±180.5	266.7±23.3	4.9	1502.2	17
2 nd					
Before 1981	1541.8±40.9	287.8±17.1	5.3	1633.9	27
After 1981	1429.0±178.6	271.6±22.9	5.3	1604.7	17
3 ed					
Before 1981	1529.6±235.9	287.5±26.2	5.3	1622.7	14
After 1981	1655.2±402.5	285.0±20.2	5.8	1771.3	19
4 th					
Before 1981	1557.9±130.9	300.1±25.5	5.2	1583.3	7
After 1981	1864.0±500.2	291.3±20.9	6.4	1951.7	7
5 th					
Before 1981	1535.7±39.0	311.3±4.0	4.9	1503.9	3
After 1981	1537.5±52.0	308.0±10.6	5.0	1522.5	4
Total					
Before 1981	1507.5±156.5	293.9±21.1	5.1	1564.6	86
After 1981	1561.8±262.8	284.9±19.6	5.5	1670.5	64

BREEDING BUFFALOES

TABLE (7)

Live body Weight for Buffaloes in the New Valley Farm (Kg)

Age	n	Mean± St. Dev.	Range
Male:-			
At Birth	50	32.0 ± 1.34	28 - 35
2 years	14	411.6± 42.47	370 - 520
2.5 "	20	422.2± 36.66	375 - 485
3.0 "	17	439.3± 39.60	385 - 515
Elder bulls >4.5 years	3	620.0± 36.1	580 - 650
Female:			
At Birth	72	31.5 ± 3.4	27 - 38
Elder (non pregnant) cows > 5 years	10	594.0± 52.7	450 - 625