

## THE EFFECT OF YEAR AND SEX ON WEIGHT CHANGES FROM BIRTH TO WEANING OF SWAMP BUFFALOES

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*Keywords:* Swamp buffaloes, Birth, Weaning weights.

### RINGKASAN

Kajian selama enam tahun (1976–1981) ke atas anak-anak kerbau yang baru lahir, berumur tiga bulan dan enam bulan dan anak-anak kerbau yang diceraikan susu telah dijalankan di Stesen MARDI Bukit Ridan. Tahun-tahun yang berkaitan adalah memberikan perbezaan kepada segala berat-berat yang dikajikan. Jantina dan interaksi tahun dengan jantina tidak mengakibatkan apa-apa perbezaan kepada berat lahir 3–, 6–bulan dan semasa penceraian susu. Purata berat lahir, 3–, 6–bulan dan semasa penceraian susu di antara anak betina dan anak jantan kerbau adalah  $29.4 \pm 2.0$  dan  $30.9 \pm 2.0$  kg,  $91.6 \pm 25.4$  dan  $93.1 \pm 22.3$  kg,  $135.8 \pm 18.0$  dan  $141.3 \pm 13.0$  kg,  $156.0 \pm 37.5$  kg dan  $157.1 \pm 38.9$  kg masing-masing.

Untuk keseluruhannya bagi kedua jantina di atas berat yang dikaji adalah  $30.3 \pm 5.9$  kg,  $92.3 \pm 23.9$ ,  $139.2 \pm 23.0$  kg dan  $156.5 \pm 38.0$  kg masing-masing.

### INTRODUCTION

Swamp buffaloes have been in the country for many years and very little information on their growth performance on improved pasture have been documented. These are reared in the country by farmers for draft purposes in padi fields and lately in the oil palm plantations for hauling oil palm fruit bunches. There is a decline in the swamp buffalo population in Malaysia at the moment. Buffaloes had been integrated with plantation crop (YEOH, 1978). APPLETON, DRYDEN and KONDOS, (1976) found buffaloes to be more efficient than Brahman and Banting cattle in converting low quality feed to animal protein.

The purpose of this study was to evaluate the performance as influenced by year, sex and year X sex on preweaning weights of swamp buffaloes under improved management at MARDI Research Station, Bukit Ridan, Pekan, Pahang.

### MATERIALS AND METHODS

Data for this study were collected from the swamp buffalo herd maintained at MARDI Research Station, Bukit Ridan, Pekan, Pahang. The herd was maintained on

improved pasture consisting of Guinea grass (*Panicum maximum*), *Brachiaria* (*B. decumbens*) and *Setaria* (*Setaria spheculata*). The pastures were fertilized with 200 kg N, 50 kg P and 100 kg K per hectare annually. No concentrates were given. Salt lick with mineral salts were given *ad libitum*. The data collected were from 1976 to 1981. Birth weights and monthly weights were taken regularly. Calves were weaned at the age of nine months during the period from 1976 to 1979 and seven months during the 1980 and 1981 period. Birth weights, 3–month, 6–month and weaning weights were analysed. The linear statistical model used is shown below:–

$X_{ijk}$	= $U \pm Y_i + S_j + (YS)_{ij} + e_{ijk}$
$X_{ijk}$	= observation
$U$	= effect common to all measurements
$Y_i$	= effect due to year, $i = 76, 77, \dots, 80, 81$
$S_j$	= effect due to sex
$(YS)_{ij}$	= effect due to interactions between year and sex
$e_{ijk}$	= effect peculiar to the individual calf and assumed to be normally distributed.

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There were five sires but they were not identified in the grouping of the mating systems between 1976 to 1980. Hence the effect of sires were not included in the analysis.

## RESULTS AND DISCUSSION

Analysis of variance (*Table 1*) indicated there was no significant effect on sex and year and sex interaction on all traits studied. Year had a significant effect on birth weight. Birth weights in 1978 were the heaviest (33.1 kg) and 1976 birth weights

were the lightest (27.8 kg) (*Table 2*). The lighter weights were attributed to the younger age of the dams that calved down in 1976. In 1981, birth weights were 28.8 kg. The lighter birth weights during this year was due to the inclusion into the herd of heifers dams. Studies have shown that age of dam influenced birth weight in buffaloes (CHANTALAKHANA, VITOON, SURASHAD, CHOOKIATE and SORNTHPE, 1979; AMAN, LIANG and SHOKRI, 1982). In cattle, BROWNSON (1975) showed that birth weight was significantly affected by sex, age of dam, sire and year.

Table 1. Analysis of variance showing birth, 3-month, 6-month and weaning weights of swamp buffalo

Source	Birth – weight		3-month – weight		6-month – weight		Weaning weight	
	df	Mean squares	df	Mean squares	df	Mean squares	df	Mean squares
Year (Y)	5	129**	5	2 401**	5	5 985**	5	7 637 **
Sex (S)	1	126	1	73	1	485	1	0.3
Y x S	5	11	5	251	5	494	5	2 600
Error	194	36	161	544	146	994	106	1 456
Total	205		172		157		117	

\*\*P<0.01.

Table 2. Birth weight (kg) of swamp buffaloes by year and sex

Year	Sex		Combined
	Male	Female	
1976	28.0 ± 5.7 ( 9)	27.7 ± 4.6 ( 10)	27.8 ± 5.0 <sup>b</sup> ( 19)
1977	33.2 ± 4.8 (15)	29.4 ± 6.4 ( 22)	30.9 ± 6.1 <sup>ab</sup> ( 37)
1978	33.5 ± 5.1 (22)	32.7 ± 5.5 ( 26)	33.1 ± 5.2 <sup>a</sup> ( 48)
1979	29.8 ± 5.3 (18)	28.7 ± 6.8 ( 22)	29.2 ± 6.3 <sup>b</sup> ( 40)
1980	31.1 ± 4.5 ( 8)	29.6 ± 5.6 ( 9)	30.3 ± 5.1 <sup>ab</sup> ( 17)
1981	29.7 ± 5.2 (19)	28.2 ± 6.3 ( 26)	28.8 ± 5.3 <sup>b</sup> ( 45)
Mean	30.9 ± 2.0 (91)	29.4 ± 2.0 (115)	30.3 ± 5.9 (206)

Means under same column with different superscripts are different at p<0.05. Number in parenthesis indicates number of observation.

Year had a highly significant effect on 3-month weight (*Table 1*). The mean 3-month weight for 1977 was the heaviest, 101.8 kg ( $p < 0.05$ ) and was the lightest 79.4 kg (*Table 3*) in 1979. The drop in weight in 1979 was due to wasting disease that occurred in the farm that year. In 1980 and 1981, there was an improvement of 3-month weights when compared to those of 1978. Management in respect of health and regular fertilizer application for pasture also contributed to the improvement of 3-month weight in 1980 and 1981.

The males were heavier than the females (93.1 kg vs 91.6 kg) at age 3-month for the six year period studied (*Table 3*). However, in 1977 the males were lighter by about 10 kg (96.8 kg vs 106.4 kg). The mean 3-month weight of male and female buffaloes were 93.1 kg vs 91.6 kg respectively with a moderate variation in weight for both the sexes. The combined 3-month weight of buffaloes studied was  $92.3 \pm 23.9$  kilogrammes. The variation of 3-month weights ranged from 9.5 to 25.1 kg which was considered moderate. The 3-month weight in 1980 was the lowest in the six year data studied with slight variability in 1978.

Year had a highly significant effect on the 6-month weight of the buffaloes herd (*Table 1*). As indicated in *Table 4*, the 6-

month combined weight in 1979 was 116.6 kg which was the lightest weight among the six years studied. This again was due to the wasting disease occurrence in the farm during that year which affected most of the farm animals. The heaviest combined 6-month weight was in 1976 with 150.0 kilogrammes. In 1980 and 1981, the weights were 130 kg respectively and a mean of  $139.2 \pm 23.0$  kg for the six years studied. The variation of the 6-month weight at this farm in the six year study ranged from 19.0 kg to 43.1 kilogrammes.

The males were 141.3 kg compared to 135.8 kg in females at 6-month age but were not significantly different. During the other years the males were heavier than the female calves and the difference ranged from 1 kg to 23 kilogrammes. The range in 6-month weight of males was 16.3 kg to 48.3 kilogrammes.

The mean weight at 6-month was 139.2 kg (CHANTALAKHANA *et al.*, 1979) and BHANNASIRI (1975) reported 103 kg at 6-month of age of Thailand swamp buffaloes under village conditions. From this, it can be indicated that the Malaysian swamp buffaloes under improved management system are heavier in weight compared to the Thailand swamp buffaloes of similar age groups. RATHI and BALANIE (1971)

Table 3. Three-month weight (kg) of swamp buffaloes by year and sex

Year	Sex		Combined
	Male	Female	
1976	91.9 $\pm$ 15.0 ( 8)	90.4 $\pm$ 30.5 (10)	91.1 $\pm$ 18.9 <sup>abc</sup> ( 18)
1977	96.8 $\pm$ 18.9 (14)	106.4 $\pm$ 24.6 (15)	101.8 $\pm$ 23.6 <sup>a</sup> ( 29)
1978	100.9 $\pm$ 22.0 (18)	99.1 $\pm$ 18.6 (21)	99.9 $\pm$ 20.5 <sup>a</sup> ( 39)
1979	82.9 $\pm$ 17.2 (14)	76.7 $\pm$ 21.7 (19)	79.4 $\pm$ 19.5 <sup>c</sup> ( 33)
1980	85.9 $\pm$ 25.4 ( 8)	77.7 $\pm$ 24.7 ( 7)	82.1 $\pm$ 25.1 <sup>bc</sup> ( 15)
1981	94.4 $\pm$ 19.0 (17)	92.1 $\pm$ 25.7 (22)	93.1 $\pm$ 23.0 <sup>ab</sup> ( 39)
Mean	93.1 $\pm$ 22.3 (79)	91.6 $\pm$ 25.4 (94)	92.3 $\pm$ 23.9 (173)

Means under same column with different superscripts are different at  $p < 0.05$ . Number in parenthesis indicates number of observation.

Table 4. Six-month weight (kg) of swamp buffaloes by year and sex

Year	Sex		Combined
	Male	Female	
1976	153.0 ± 16.3 ( 8)	147.2 ± 22.4 ( 8)	150.0 ± 19.0 <sup>a</sup> (16)
1977	145.9 ± 48.3 (15)	152.8 ± 39.8 (15)	149.4 ± 43.1 <sup>ab</sup> (30)
1978	153.4 ± 32.5 (18)	154.0 ± 31.7 (19)	153.7 ± 31.7 <sup>a</sup> (37)
1979	119.0 ± 21.8 (12)	114.5 ± 30.2 (14)	116.6 ± 26.8 <sup>c</sup> (26)
1980	142.0 ± 33.5 ( 7)	118.9 ± 30.7 ( 7)	130.4 ± 33.0 <sup>bc</sup> (14)
1981	134.5 ± 24.6 (15)	127.2 ± 27.6 (20)	130.3 ± 25.8 <sup>bc</sup> (35)
Mean	141.3 ± 13 (75)	135.8 ± 18 (83)	139.2 ± 23 (158)

Mean under same column with different superscripts are different at  $p < 0.05$ . Number in parenthesis indicates number of observation.

reported a rapid growth in weights was found to occur in first five months with a peak in second month from progeny of 57 sires of Indian buffaloes.

Age of dam influenced ( $p < 0.01$ ) calf preweaning gains and weights in cattle (NELSON, BEAVERS and STEWART, 1982). They found calves from four to seven year old cows to have greater average daily gain from birth to 130 days and from 130 days to 210 days and higher ( $p < 0.05$ ) calf weight at 130 days and at 210 days than progeny of younger dams.

The weight during weaning in 1976 was the heaviest,  $182.1 \pm 61.8$  kg ( $p < 0.05$ ) and in 1980 the lightest at  $136.4 \pm 60.2$  kilogrammes (Table 5). The difference in weaning weight for these years was due to the animals being weaned at about nine months in 1976 as compared to that at about seven months in 1981. In 1977 and 1978, the females were heavier with weights weighing at 191.8 kg vs 161.6 kg and 185.7 kg vs 151.6 kg respectively. The overall weaning weight for males and females were  $157.1 \pm 38.9$  kg and  $156.0 \pm 37.5$  kilogrammes. The range of weaning weight for both sexes were from 28.0 kg to

Table 5. Weaning weight (kg) of swamp buffaloes by year and sex

Year	Sex		Combined
	Male	Female	
1976	193.4 ± 58.4 ( 8)	170.8 ± 63.2 ( 8)	182.1 ± 61.8 <sup>a</sup> ( 16)
1977	161.6 ± 43.2 (11)	191.8 ± 50.3 (12)	177.3 ± 45.3 <sup>a</sup> ( 23)
1978	151.6 ± 29.5 ( 8)	185.7 ± 27.2 ( 3)	160.9 ± 28.0 <sup>ab</sup> ( 11)
1979	160.8 ± 42.1 ( 9)	150.8 ± 30.2 (12)	155.1 ± 35.5 <sup>ab</sup> ( 21)
1980	150.3 ± 50.8 ( 7)	122.6 ± 70.5 ( 7)	136.4 ± 60.2 <sup>a</sup> ( 14)
1981	138.3 ± 32.2 (15)	137.0 ± 27.8 (18)	137.6 ± 29.2 <sup>b</sup> ( 33)
Mean	157.1 ± 38.9 (58)	156.0 ± 37.5 (60)	156.5 ± 38.0 (118)

Means under the same column with different superscripts are different at  $P < 0.05$ . Number in parenthesis indicates number of observation.

61.8 kg during the six year study. The combined weaning weights of both the sexes were  $156.5 \pm 38.0$  kilogrammes. These weaning weights were found to be heavier than those reported in Thailand (BHANNASIRI, 1975).

Figure 1 shows the relationship between age and weights of swamp buffaloes of the traits studied. The pattern of the curves were about similar for all traits. In 1979, the outbreak of wasting diseases in the farm, not only caused high mortality rate but also affect all weights of buffalo calves from birth to 6-month including their weaning weights (Figure 1). Generally, the buffalo calves showed heavier weight in 1978 than in the other years of the 6-year period of study.

CONCLUSION

Year had significant influence on birth, 3-month, 6-month and weaning weights of

the buffaloes. Sex and year X sex interaction had no significant effect on the traits studied. This indicated that the variability and availability of the pastures affected the various weights studied. As more pastures were made available and frequent addition of fertilizers on pasture at later years, the weights improved. The less intense stocking rate due to an increase of pasture areas also influenced the weight differences in the traits studied. Also the influence of age of dam affected performance of swamp buffaloes (AMAN *et al.*, 1982) under similar conditions.

From this study, it was observed that the Malaysian swamp buffaloes under improved management were heavier than the Thailand swamp buffaloes in village conditions (BHANNASIRI, 1975, CHANTALAKHANA *et al.*, 1979) under similar age groups. Growth rates (AMAN *et al.*, 1982) of

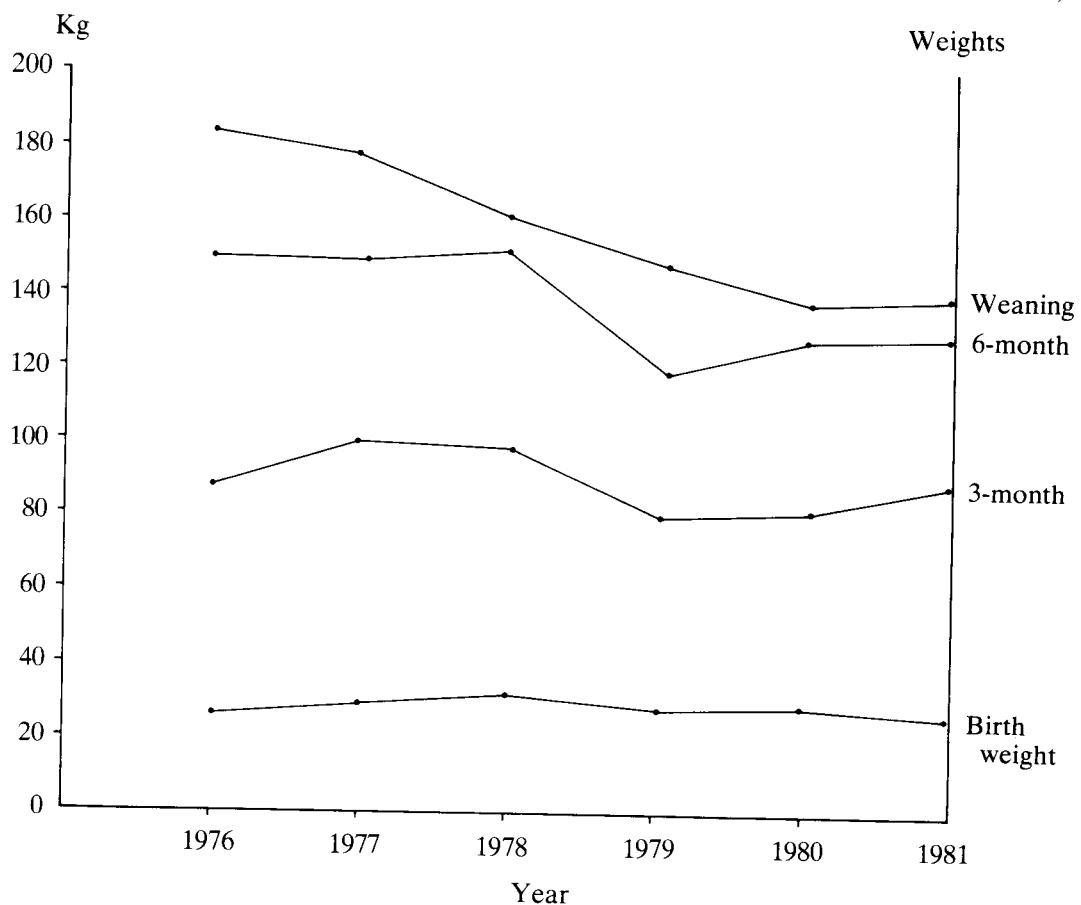


Figure 1. Relationship between age and weight of swamp buffaloes.

these swamp buffaloes were found to be as good as cattle on improved pastures. The performance of these swamp buffaloes could be further improved by using selected sires and dams on this management system. This was indicated by the range of weights of their offsprings at 3-month, 6-month and weaning weights which were from 9.5 kg to 25.1 kg,

23.0 kg to 42.0 kg and 28.0 kg to 61.8 kg respectively. Swamp buffaloes cannot be neglected entirely because production from buffalo meat alone amounted to 30 percent of total meat consumed in the country. An efficient utilisation of this species in terms of production should be considered in the near future.

## SUMMARY

An analysis of six year data (1976–1981) on birth, 3-month, 6-month and weaning weights of Malaysian swamp buffaloes were collected and analysed. Year had a significant effect on all the traits studied. Sex and year X sex interaction had no influence on these traits. The mean birth, 3-month, 6-month and weaning of females and males were  $29.4 \pm 2.0$  vs  $30.9 \pm 2.0$  kg,  $91.6 \pm 25.4$  vs  $93.1 \pm 22.3$  kg,  $135.8 \pm 18.0$  vs  $141.3 \pm 13.0$  kg, and  $156.0 \pm 37.5$  kg vs  $157.1 \pm 38.9$  kg respectively. The combined weights of both the sexes in these traits were  $30.3 \pm 5.9$  kg,  $92.3 \pm 23.9$  kg,  $139.2 \pm 23.0$  kg and  $156.5 \pm 38.0$  kg respectively.

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