RETROSPECTIVE PERFORMANCE AND MORPHOLOGICAL CHARACTERISTICS OF KEDAH-KELANTAN CATTLE IN MALAYSIA

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ABSTRACT. This study aims to gather the performance and morphological information of Kedah-Kelantan (KK) cattle from a government nucleus farm in Tanah Merah, Kelantan. Data from 1995 to 2005 was used to analyse growth performance and data from 1990 to 1999 for the reproductive performance. The morphological characteristics were evaluated from animals in the farm. The growth performance was evaluated by year of birth and sex. According to different years of birth, the observations on the calculated average daily weight gain (ADG) and corrected weight (WT) showed inconsistency in performance throughout the period. However, the weight (WT) at specific ages (BWT, WT200, WT360, WT540 and WT720) increased significantly especially in males. The mean of birth weights were 14.31 kg for males and 13.95 kg females. The mean of average daily weight gains for ADG200, ADG360, ADG540 and ADG720 were slightly higher for males than the females. Based on the year of birth, age at first calving and calved to conception, there were no significant difference in calving intervals except for year 1991 and 1992 and year 1993. The mean of age at first calving, calved to conception and calving interval were 1496 days, 180 days and 542 days respectively. According to sex, the mean wither heights were 127.42 cm for males and 107.66 cm for females. The mean of body length also showed higher values in males compared to females which were 162.56 cm and 147.39 cm respectively; showing that there was a significant difference in body size between males and females.

Keywords: Kedah-Kelantan cattle, performance, morphological, Malaysia

INTRODUCTION

Kedah-Kelantan (KK) cattle are indigenous to Malaysia, found throughout the country mainly in the northern states of peninsular Malaysia. It is well-known for its tolerance of drought and heat which makes it well adaptable to the tropical environment. It is mainly bred for beef production suitably in oil palm plantations. In 2013, the Department of Veterinary Services (DVS) has about 1,000 heads of purebred KK cattle at the Tanah Merah nucleus and conservation farm. While production data is recorded on this farm, much more work needs to be done to genetically improve the KK breed (DVS, 2013).

KK cattle usually have a fawn to dark brown coat but could also be found in black, brownish gray and grayish white. Both males and females have two small variably shaped horns. They have a short head and small, pointed and droopy ears with a moderately developed hump and a small compact body which is well proportioned. Wither heights are 102 cm and 96 cm for males and females respectively (FAO, 2009).

The mean birth weight of males is 15.8 ±3.0 kg and for females is 14.7±2.7 kg. The weaning weight (at 6 months of age) is 59.6±6.9 kg for males and 55.6±1.5 kg for females. A mature weight is achieved by 3 to 4 years of age for males at 214.5±9.8 kg and 173.7±7.0 kg for females. Under good management, an annual calving percent of 80 is possible. Milk production is sufficient to rear a calf and is estimated to be 2.5 kg per day. Calf mortality up to one year old is between 5 to 15 percent depending on management systems. Females will first calve at 27 to 30 months and cows have a calving interval of 341 days (Devendra *et al.*, 1975).

Calving interval and growth performance are important traits influencing profitability in the majority of beef production systems (Matos *et al.*, 2002). Thus, in this research, growth and reproductive performance of KK cattle have been studied. Physical characteristics of the cattle also have been observed to get further information regarding morphology of KK.

MATERIALS AND METHOD

The animals involved in this study were from a government nucleus herd of KK breed at Pusat Ternakan Haiwan (PTH) Pantai Timor, Tanah Merah, Kelantan. The animals were reared under a semi-intensive system where cattle are allowed to graze freely in a fenced pasture. Minerals and water were provided *ad libitum*.

Growth Performance

A total number of 3,230 data from 1995 to 2005 was extracted from DairyChamp software. Statistical Package for Social Science Windows Release 10 (1999) by SPSS Inc. software was used to analyse the average daily weight gain (ADG) from ages 0 to 200 days (ADG200), 0 to 360 days (ADG360), 0 to 540 days (ADG540) and 0 to 720 days (ADG720). Corrected weight (WT) were calculated at ages 200 days (WT200), 360 days (WT360), 540 days (WT540), 720 days (WT720) and at birth (BWT). The growth performance was evaluated by sex and year of birth. The least square difference (LSD) method was used to analyse the significance of mean differences. The coefficient correlation analysed the relationship between growth performance traits.

Reproductive Performance

A total number of 1,753 data from 1990 to 1999 was extracted from DairyChamp software. Statistical Package for Social Science (SPSS) software was used to analyse the age of first calving, calved to conception period and calving interval. Calved to conception period and calving interval were calculated based on the first lactation of the animals. The reproductive performance was evaluated by sex and also by year of birth. The least square difference (LSD) method was used to analyse the significance of mean differences.

Morphological Characteristics

A random sample of 173 KK cattle of ages three years and above were selected and the wither height and body length were measured. The horn shape and coat colour for each animal were observed. The mean

of wither height and body length were calculated using the SPSS software.

RESULTS AND DISCUSSION

Growth Performance

ADG and WT at different ages were calculated and the result is shown in Table 1. ADG200 was highest (0.33 kg), slowly decreasing from ADG360 (0.23 kg), ADG540 (0.21 kg) to ADG720 (0.20 kg). This is in disagreement with the study by Bedhane (Bedhane M., 2008) which stated that there was an improvement in ADG performance with incremental age of the Ethiopian cattle breed.

ADG from 1995 to 2005 showed inconsistency in performance (Figure 1). ADG increased gradually from 1995 to 1998 and started to decrease from 1999 to 2000 and then increased again until 2002. The ADG

Table 1. Mean average daily weight gain (ADG) (kg) and corrected weight (WT) (kg) with standard error against different ages by year of birth

YEAR OF BIRTH	ADG200	ADG360	ADG540	ADG720	BWT	WT200	WT360	WT540	WT720
1995	-	0.245 ± 0.003 [b]	0.214 ± 0.002 [b]	0.184 ± 0.004 [b]	14.97 ± 0.120 [b]	-	88.535 ± 1.105 [b]	115.785 ± 1.551 [b]	132.630 ± 3.041 [b]
1996	0.315 ± 0.008 [a]	0.258 ± 0.007 [b]	0.214 ± 0.005 [b]	0.178 ± 0.004 [a]	16.91 ± 0.251 [b]	63.173 ± 1.691 [a]	93.161 ± 2.658 [b]	115.726 ± 2.859 [b]	128.523 ± 2.828 [a]
1997	0.407 ± 0.009 [a]	0.231 ± 0.012 [a]	0.212 ± 0.008 [b]	0.172 ± 0.017 [a]	11.46 ± 0.392 [b]	81.550 ± 18.102 [a]	83.431 ± 4.388 [a]	114.970 ± 4.530 [b]	124.372 ± 12.498 [a]
1998	0.472 ± 0.019 [a]	0.178 ± 0.011 [b]	0.132 ± 0.006 [b]	0.164 ± 0.074 [a]	11.92 ± 0.261 [b]	94.505 ± 1.112 [a]	64.393 ± 3.976 [b]	71.624 ± 3.433 [b]	118.253 ± 52.886 [a]
1999	-	0.182 ± 0.011 [b]	0.178 ± 0.018 [a]	0.182 ± 0.044 [a]	12.68 ± 0.252 [a]	-	65.659 ± 4.058 [b]	96.427 ± 9.401 [a]	131.384 ± 32.088 [a]
2000	-	0.211 ± 0.003 [a]	0.201 ± 0.004 [b]	0.207 ± 0.006 [b]	13.35 ± 0.143 [a]	-	75.975 ± 1.361 [a]	108.335 ± 2.061 [a]	149.077 ± 4.869 [b]
2001	0.276 ± 0.014 [a]	0.207 ± 0.003 [a]	0.224 ± 0.004 [b]	0.237 ± 0.004 [b]	12.67 ± 0.091 [b]	55.368 ± 2.830 [a]	74.848 ± 1.146 [a]	121.337 ± 2.052 [b]	171.268 ± 2.731 [b]
2002	0.412 ± 0.017 [b]	0.266 ± 0.005 [b]	0.253 ± 0.004 [b]	0.237 ± 0.004 [b]	13.47 ± 0.111 [a]	82.569 ± 3.502 [b]	95.765 ± 1.873 [b]	136.693 ± 2.304 [b]	171.128 ± 3.182 [b]
2003	0.354 ± 0.087 [a]	0.247 ± 0.004 [b]	0.217 ± 0.005 [b]	0.204 ± 0.007 [b]	13.95 ± 0.146 [a]	70.954 ± 1.758 [a]	89.167 ± 1.703 [b]	117.388 ± 2.658 [b]	147.556 ± 5.244 [b]
2004	0.332 ± 0.019 [a]	0.241 + 0.006 [a]	0.189 ± 0.007 [b]	0.186 ± 0.008 [b]	14.47 ± 0.113 [b]	66.551 ± 3.968 [a]	86.594 ± 2.416 [a]	102.057 ± 3.906 [a]	133.901 ± 5.424 [b]
2005	0.268 ± 0.073 [a]	0.221 ± 0.006 [a]	0.185 ± 0.006 [a]	0.159 ± 0.011 [a]	13.47 ± 0.121 [a]	53.771 ± 14.596 [a]	79.443 ± 2.474 [a]	99.905 ± 3.559 [a]	114.531 ± 7.888 [a]
Total	0.334 ± 0.005	0.233 ± 0.002	0.214 ± 0.002	0.204 ± 0.002	14.14 ± 0.062	66.952 ± 1.182	84.106 ± 0.592	116.016 ± 0.884	147.407 ± 1.532

a, b mean with different superscript (compared to 2005) within a column are significantly different at $p < 0.05$

Table 2. Mean average daily weight gain (ADG) (kg) and Weight (WT) (kg) with standard error against different ages by sex.

SEX	ADG200	ADG360	ADG540	ADG720	BWT	WT200	WT360	WT540	WT720
Male	0.350 ± 0.009 [a]	0.243 ± 0.002 [a]	0.223 ± 0.002 [a]	0.216 ± 0.056 [a]	14.31 ± 0.09 [a]	70.015 ± 1.87 [a]	87.487 ± 0.86 [a]	120.413 ± 1.41 [a]	156.191 ± 2.36 [a]
Female	0.321 ± 0.007 [b]	0.223 ± 0.002 [b]	0.207 ± 0.002 [b]	0.192 ± 0.043 [b]	13.95 ± 0.06 [b]	64.354 ± 1.46 [b]	80.369 ± 0.78 [b]	111.903 ± 1.06 [b]	138.595 ± 1.81 [b]
Total	0.334 ± 0.005	0.233 ± 0.002	0.214 ± 0.002	0.204 ± 0.052	14.14 ± 0.06	66.952 ± 1.18	84.106 ± 0.59	116.016 ± 0.88	147.407 ± 1.53

a, b mean with different superscript within a column are significantly different at $p < 0.05$

Table 3. Coefficient correlation of growth performance traits.

	ADG200	ADG360	ADG540	ADG720	BWT	WT200	WT360	WT540	WT720
ADG200	1								
ADG360	0.654**	1							
ADG540	0.659**	0.783**	1						
ADG720	0.679**	0.574**	0.812**	1					
BWT	-0.028	0.178**	-0.031	-0.221**	1				
WT200	10.000**	0.654**	0.659**	0.679**	-0.028	1			
WT360	0.654**	10.000**	0.783**	0.574**	0.178**	0.654**	1		
WT540	0.659**	0.783**	10.000**	0.812**	-0.031	0.659**	0.783**	1	
WT720	0.679**	0.574**	0.812**	10.000**	-0.221**	0.679**	0.574**	0.812**	1

** Correlation is significant at $p < 0.01$

Table 4. Mean age at first calve (days), calve to conception period (days) and calving interval (days) with standard error by year of birth.

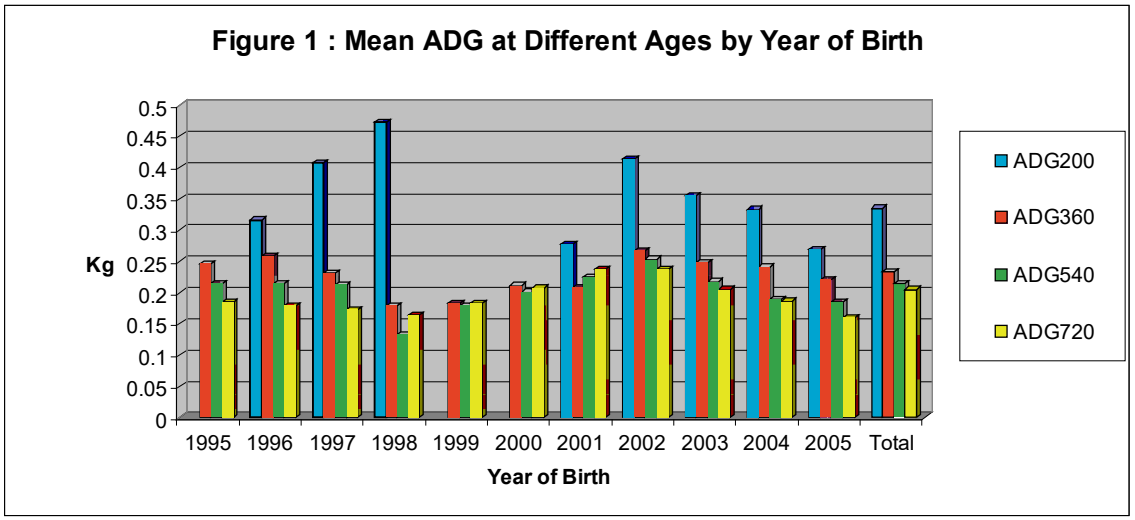
YEAR OF BIRTH	AGE AT FIRST CALVING	CALVED TO CONCEPTION	CALVING INTERVAL
1990	1592.92 ± 35.99 [a]	199.54 ± 20.59 [a]	557.17 ± 31.63 [a]
1991	1371.37 ± 32.26 [b]	135.6 ± 14.53 [b]	508.13 ± 37.04 [a]
1992	1371.72 ± 58.95 [b]	155.93 ± 23.91 [b]	555.94 ± 41.08 [a]
1993	1407.71 ± 101.45 [a]	181.34 ± 39.46 [a]	729.25 ± 71.91 [b]
1994	1619.46 ± 109.29 [a]	215.13 ± 51.42 [a]	593.9 ± 79.12 [a]
1995	1576.00 ± 36.83 [a]	204.63 ± 17.88 [a]	520.99 ± 23.71 [a]
1996	1534.57 ± 45.07 [a]	211.42 ± 27.10 [a]	542.88 ± 33.56 [a]
1997	1467.58 ± 44.96 [a]	141.5 ± 20.27 [a]	487.14 ± 48.43 [a]
1998	1331.2 ± 117.87 [a]	178.55 ± 44.51 [a]	354.00 ± 23.73 [a]
1999	1655.17 ± 166.24 [a]	71.14 ± 16.24 [a]	329.33 ± 13.41 [a]
Total	1496.06 ± 17.15	180.24 ± 8.32	542.79 ± 13.84

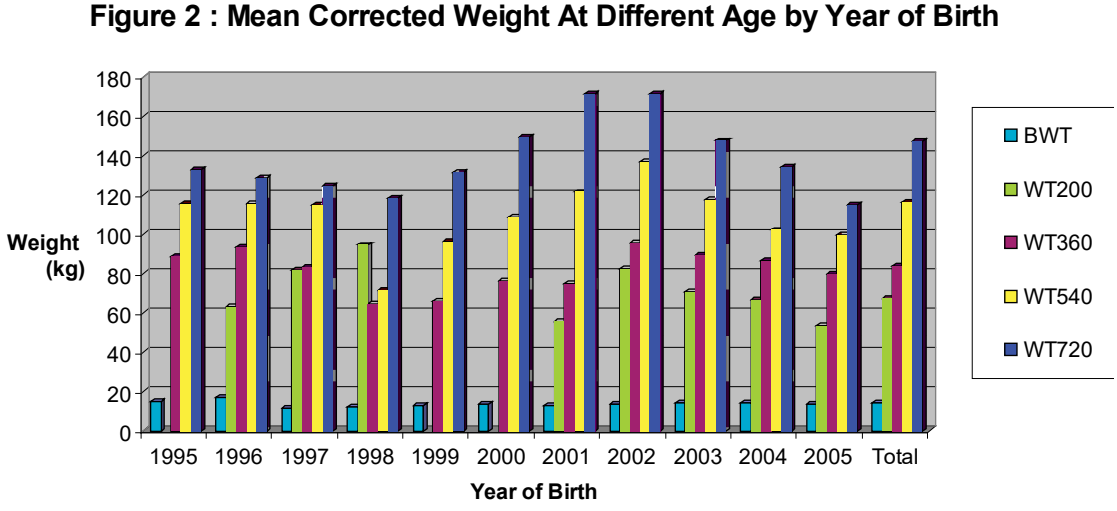
a, b mean with different superscript (compare to 1999) within a column are significantly different at $p < 0.05$

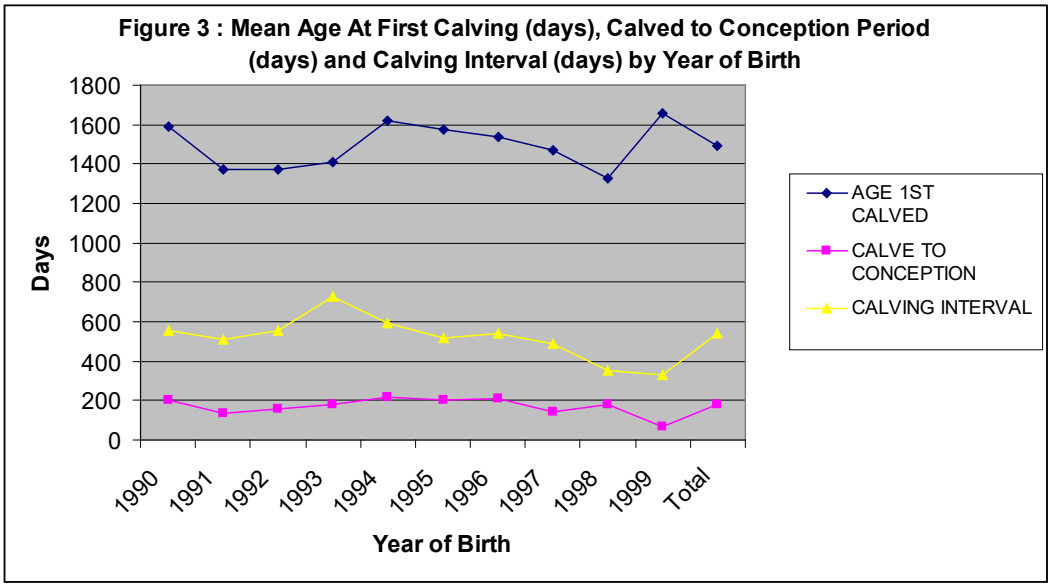
Table 5. Mean of wither height and body length (cm) with standard error for different sexes.

Sex	Wither Height	Body Length
Males	127.42 ± 4.42 [a]	162.56 ± 4.64 [a]
Females	107.66 ± 0.78 [b]	147.39 ± 0.55 [b]
Total	108.35 ± 0.82	147.92 ± 0.59

a, b mean with different superscript within a column are significantly different at $p < 0.05$







performance for cattle born in 2005 however is lowest compared to the other years from 1995 to 2005.

The inconsistency in ADG performance is possibly caused by inconsistencies in feeding and management factors. The genetic quality of the animal is still preserved as shown in the incremental performance of ADG from 2000 to 2002. The effect of environment and management on the growth performance of cattle has been discussed intensively before (Field and Taylor, 2008). While the basic breeding programme has been established for genetic selection of the best animal, much work still needs to be done to genetically improve the KK breed.

Mean of BWT were 14.31 kg and 13.95 kg for males and females, respectively (Table 2). It showed a decreased of 9.4% for males and 5.1% for females as compared to a study by Devendra (1975). Similarly for ADG, the corrected weight at different ages (WT200, WT360, WT540 and WT720) showed the inconsistent performance of cattle born in 1995 to 2005 (Figure 2). It is not a surprise as WT and ADG showed a high significant correlation ($p < 0.01$), see Table 3.

Performance of WT for cattle born in 2005 were found lower compared to the year before which is 13.47 kg BWT, 53.77 kg WT200, 79.44 kg WT360, 99.91 kg WT540 and 114.53 kg WT720. The same performance patterns between ADG and WT indirectly provided an added proof that management and feeding were factors in the inconsistent growth performance during the period.

Reproductive Performance

As shown in Table 4, from 1990 to 1999, mean age of first calving was about 50 months (1496 days), calve to conception was 180.24 days and calving interval was 542.79 days. Observations throughout 1990 to 1999 showed the inconsistency of reproductive

performance. There was no significant difference in age of first calving for cows born in 1999 compared to other years except for cows born in 1991 and 1992. The result was also the same for calved to conception and calving interval period. This could be due to environmental and management factors. Reproductive performance and fertility are generally understood to be complex phenomena, involving the interplay of genetic and environmental factors. Environmental factors are management (detection of oestrus, bull to cow ratio and animal age), nutrition, diseases and parasites, and season of the year (McDowell, 1971).

However, the cows born in 1999 have shown an improvement in terms of calved to conception period and calving interval period which was 71 days and 329 days, respectively, as compared to earlier years (Figure 3).

Morphological Characteristics

From 173 random samples measured, all of the KK cattle have shown the same coat colour as mentioned in DAD-IS (FAO, 2009) which were 69.8% and 30.2% for dark brown and fawn, respectively. 100% of the samples have shown the characteristic long tail and small horns with various shapes. Wither height for males was 127.42±4.42 cm and for females was 107.66±0.78 cm. The body length for males was 162.56±4.64 cm and for females was 147.39±0.55 cm (Table 5). Wither height was higher compared to the data provided in DAD-IS by 24.90% for males and 12.14% for females. This data indirectly indicates body size improvement of KK cattle from 1975.

CONCLUSION

This study found that the morphology of the Kedah-Kelantan cattle breed in a government nucleus herd in Tanah Merah, Kelantan has been maintained since the study in 1975. However, there was no indicator showing the growth performance from 1995 to 2005. The inconsistent performance of average daily weight gain and corrected weight during this period showed that there were other influencing factors in the performance such as feeding and management. The reproductive performance showed an improvement compared to the earlier generation although this difference is not significant.

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