GROWTH PERFORMANCE OF MAFRIWAL DAIRY CATTLE IN MALAYSIA

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ABSTRACT. The current Mafriwal dairy cattle breed in Malaysia is a dairy crossbred population consisting of imported first generation Sahiwal-Friesian crossbred imported from Australia and New Zealand in 1980. From 2011 to 2017, a total of 90 Mafriwal cattle from the Institute Haiwan Kluang, Johor Dairy farm were used in a study to elucidate the current trend in growth performance of this important genetic resource. The growth performance was evaluated by blood level, year of birth and sex. Statistical Package for Social Science (SPSS) software was used to calculate and analyse average daily weight gain (ADG) and weight (WT) at specific ages. According to different blood levels, the observations on the calculated ADGs (ADG200, ADG360, ADG540 and ADG720) showed consistency in performance at various blood levels. The mean of birth weight were 25.45 kg for blood level M60, 24.11 kg for blood level M80 and 21.08 kg for blood level M70. However, the weight (WT) at specific ages (BWT, WT200, WT360, WT540 and WT720) increased significantly especially at blood level M80. According to the year of birth, ADG and WT at different ages showed that there were no significant differences of Mafriwal dairy cattle. The mean ADG 200 in 2013 showed higher values at 0.41 ± 0.09 kg/day followed by ADG 200 in 2017 which was 0.393± 0.06 kg/day. According to sex, the mean birth weight was 23.68 kg for males and 23.70 kg for females; showing that the mean of birth weights were similar and there was no significant difference between mean birth weight for males and females. The mean average daily weight gain for ADG200, ADG360, ADG540 and ADG720 were slightly higher for males than the females. The weight at different ages (WT360, WT540 and WT720) also showed higher values for males than for females. However, at weight of WT200, the mean value for females was higher than the males. There was no significant differences between males and females for other weights (WT200, WT360 and WT540) but there was a significant difference between males and female at weight WT720.

Keywords: Mafriwal cattle, gowth performance, Malaysia.

INTRODUCTION

In 1974, the National Dairy Development Programme was started under the new Economic Policy. In order to organise the breeding of dairy cattle, in 1980, Department

of Veterinary Services (DVS) embarked on a crossbreeding programme involving the Sahiwal and Friesian cattle breeds imported from Australia and New Zealand. By the end of 1980, 22,713 heads of cattle were imported (Kumar R.A. *et al*., 1985) into Malaysia. The product of this programme was called the "Mafriwal" dairy cattle of Malaysia, a tropicalised synthetic dairy breed (Panandam *et al*., 2005).

The growth performance of the Mafriwal dairy cattle has been reported by several researchers. According to Cheah *et al*. (1984), the mature weight of Sahiwal crossbred cows in the station was 367 kg and females took 31 months (930 days) to reach breeding weight (272kg). Malaysian Livestock Breeding Policy 2013 also reported the two years' weight (720 days) was 272 kg, the birth weight and ADG recorded were 23 kg and 0.65kg, respectively.

The birth weight and ADG of calf is an important factor in its subsequent growth and development for beef production or milk production of the dam. Therefore, this study was conducted to elucidate the current trend in growth performance of Mafriwal dairy cattle as an important genetic resource, under local conditions.

MATERIALS AND METHOD

The data used in this study were obtained from the dairy farm at Institute Haiwan in Kluang, Johor. Management and feeding regimes on the farm were described in a report by Sivarajasingam *et al*. (1989). A total of 90 Mafriwal dairy cattle from three breed groups, namely M60, M70 and M80 from year 2011 to 2017, were extracted from Dairy Champ computer database system. SPSS software was used to calculate and analyse ADG for: 0 to 200 days age (ADG200), 0 to 360 days age (ADG360), 0 to 540 days age (ADG540) and 0 to 720 days age (ADG720). WT at specific ages (days) were also calculated correspondingly to the days age i.e. birth weight (BWT), WT200, WT360, WT540 and WT720. The growth performance was evaluated by blood level, by year of

Table 1. Mean average daily weight gain (ADG) (kg/day) and weight (WT) at specific ages (days) with standard deviation at different blood levels of Mafriwal dairy cattle.

Blood level	ADG200	ADG360	ADG540	ADG720	BWT	WT200	WT360	WT540	WT720
M60	0.331 ± 0.082 [a]	0.326 ± 0.069 [a]	0.375 ± 0.072 [a]	0.348 ± 0.061 [a]	25.45 ± 5.60 [a]	95.24 ± 21.00 [a]	147.28 ± 32.08 [a]	227.50 ± 39.68 [a]	273.33 ± 39.62 [a]
M70	0.303 ± 0.092 [a]	0.295 ± 0.079 [a]	0.329 ± 0.051 [a]	0.287 ± 0.033 [a]	21.08 ± 4.37 [b]	84.04 ± 21.92 [a]	131.04 ± 34.28 [a]	198.29 ± 29.31 [a]	225.67 ± 25.11 [a]
M80	0.378 ± 0.078 [b]	0.363 ± 0.061 [b]	0.362 ± 0.023 [a]	0.375 ± 0.022 [b]	24.11 ± 6.01 [a]	99.28 ± 15.06 [b]	153.38 ± 23.58 [b]	217.33 ± 15.07 [a]	288.67 ± 12.01 [b]
TOTAL	0.337 ± 0.088	0.328 ± 0.074	0.356 ± 0.063	0.329 ± 0.056	23.70 ± 5.64	93.20 ± 20.39	144.41 ± 31.39	215.34 ± 35.49	257.33 ± 39.45

"a" and "b" means with different superscript within a column are significantly different at $p < 0.05$.

birth and sex. Least square difference (LSD) method was used to analyse the significance of mean differences in ADG and WT.

RESULTS AND DISCUSSION

ADG and WT at different ages according to different blood levels are shown in Table 1. Observations on the calculated ADGs

Table 2. Mean average daily weight gain (ADG) (kg/d) and weight (WT) at specific ages (days) with standard deviation at different year of birth of Mafriwal dairy cattle.

Year of Birth	ADG200	ADG360	ADG540	ADG720	BWT	WT200	WT360	WT540	WT720
2011	0.356 ± 0.073	0.365 ± 0.080	ND	ND	26.00 ± 2.00	97.25 ± 13.05	157.50 ± 27.26	ND	ND
2012	0.368 ± 0.093	0.382 ± 0.068	0.375 ± 0.025	ND	24.70 ± 5.68	100.17 ± 14.95	161.63 ± 26.14	223.33 ± 13.32	ND
2013	0.409 ± 0.087	0.374 ± 0.075	0.370 ± 0.070	0.229	22.40 ± 4.25	112.45 ± 25.63	175.88 ± 43.83	222.50 ± 38.22	186.00
2014	0.316 ± 0.089	0.306 ± 0.082	0.357 ± 0.047	0.337 ± 0.062	23.95 ± 5.27	89.52 ± 19.68	135.96 ± 30.50	216.35 ± 26.21	263.60 ± 43.78
2015	0.320 ± 0.090	0.316 ± 0.068	0.352 ± 0.076	0.318 ± 0.050	23.93 ± 6.57	87.93 ± 18.82	137.70 ± 27.04	213.81 ± 43.75	250.33 ± 35.25
2016	0.321 ± 0.042	0.321 ± 0.038	0.338 ± 0.029	0.369 ± 0.013	19.86 ± 6.15	84.14 ± 8.11	135.57 ± 15.86	200.75 ± 16.84	284.67 ± 6.66
2017	0.393 ± 0.060	0.328	ND	ND	26.67 ± 3.51	107.00 ± 9.90	148.00	ND	ND
TOTAL	0.337 ± 0.088	0.328 ± 0.074	0.356 ± 0.063	0.329 ± 0.056	23.70 ± 5.64	93.20 ± 20.39	144.41 ± 31.39	215.34 ± 35.49	257.33 ± 39.45

ND = no data

Table 3. Mean Average Daily Weight Gain (ADG) (kg/d) and Weight (WT) at Specific Ages with Standard Deviation for Different Sexes of Mafriwal dairy cattle.

Sex	ADG200	ADG360	ADG540	ADG720	BWT	WT200	WT360	WT540	WT720
Male	0.344 ± 0.073 [a]	0.340 ± 0.072 [a]	0.386 ± 0.081 [a]	0.368 ± 0.043 [a]	23.68 ± 5.92 [a]	92.48 ± 16.66 [a]	146.21 ± 29.06 [a]	231.87 ± 46.29 [a]	284.75 ± 28.86 [a]
Female	0.334 ± 0.093 [a]	0.324 ± 0.074 [a]	0.345 ± 0.052 [a]	0.284 ± 0.029 [b]	23.70 ± 5.58 [a]	93.44 ± 21.64 [a]	143.83 ± 32.30 [a]	209.58 ± 29.39 [a]	226.00 ± 22.62 [b]
Total	0.337 ± 0.088	0.328 ± 0.074	0.356 ± 0.063	0.329 ± 0.056	23.70 ± 5.64	93.20 ± 20.39	144.41 ± 31.39	215.34 35.49	257.33 ± 39.45

"a" and "b" means with different superscript within a column are significantly different at $p < 0.05$

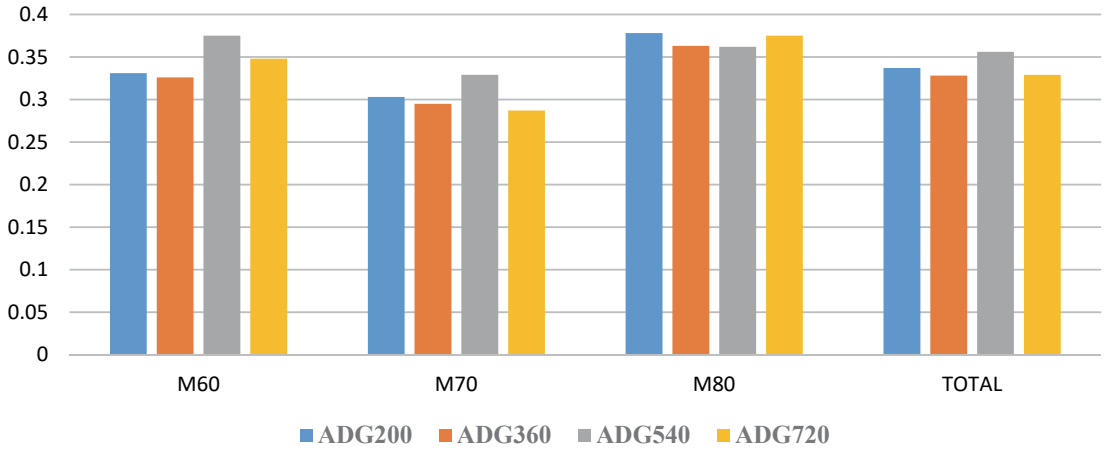

Figure 1. Mean daily weight gain (ADG) of the Mafriwal dairy cattle at different blood levels.

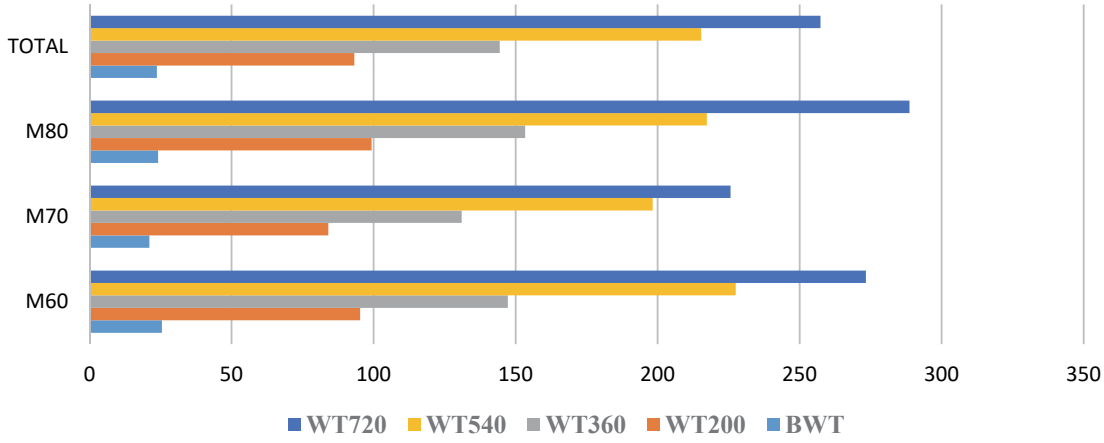

Figure 2. Mean weight at different blood levels.

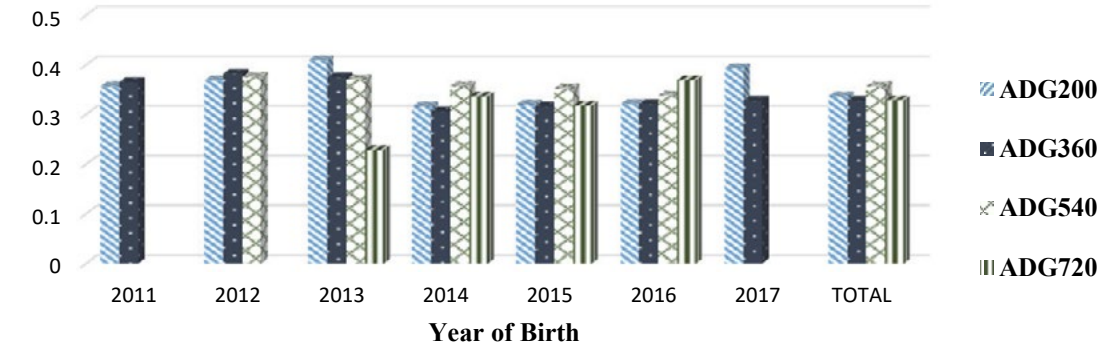

Figure 3. Mean ADG at different ages by year of birth.

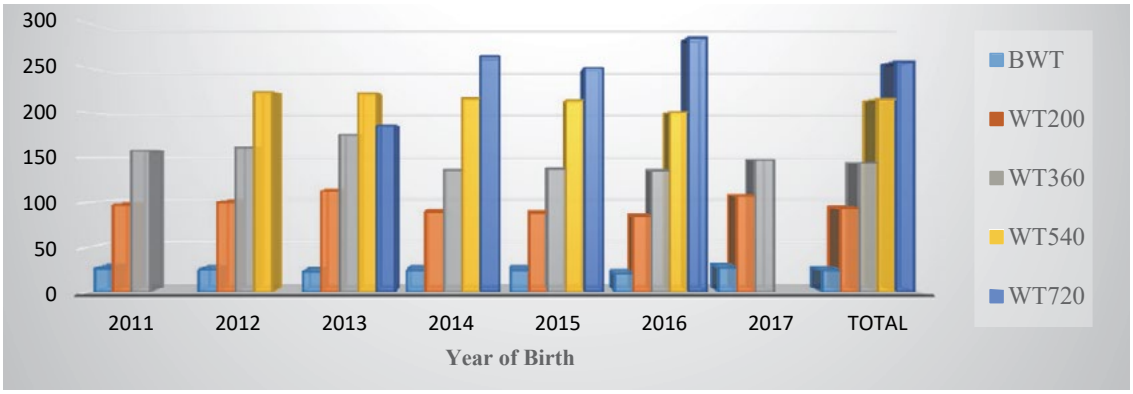

Figure 4. Mean weight (WT) of Mafriwal dairy cattle at different ages by year of birth.

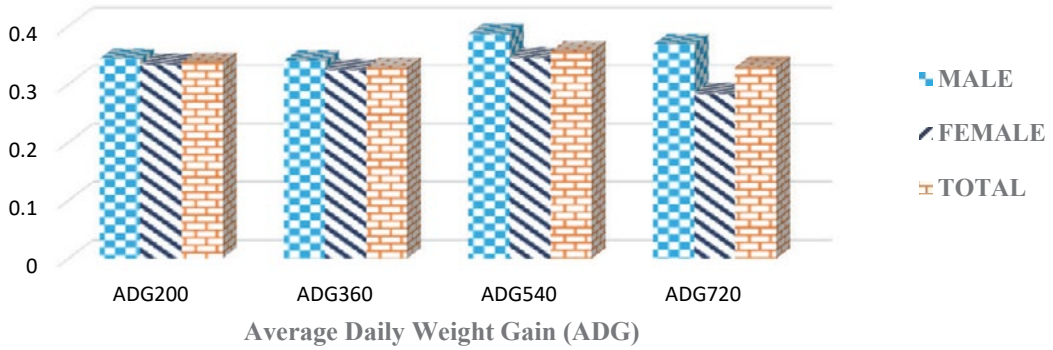

Figure 5. Mean daily weight gain (ADG) of Mafriwal dairy cattle at different ages by sex.

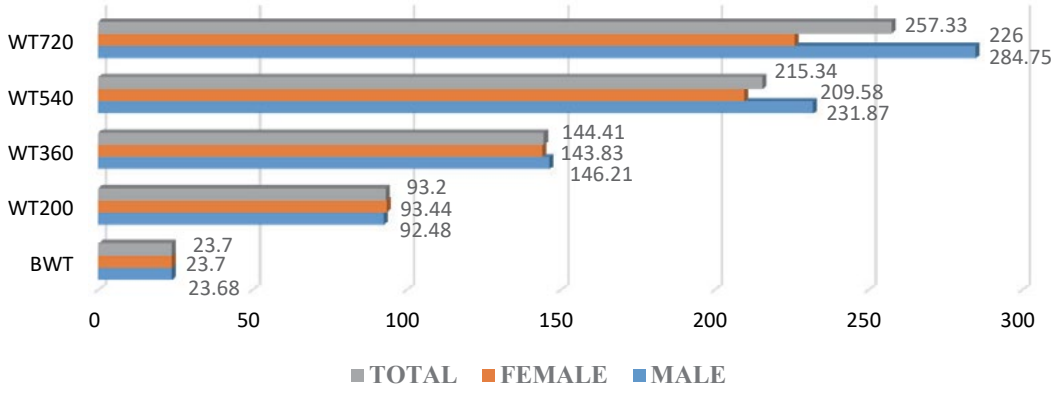

Figure 6. Mean weight at different ages by sex.

(ADG200, ADG360, ADG540 and ADG720) showed consistency in performance at blood level M80 (Figure 1).

Mean birth weight are 25.45 kg for blood level M60, 24.11 kg for blood level M80 and 21.08 kg for blood level M70 respectively. This results indicate that birth weight at blood level M60 is higher than M80 which is the same as the result at weight WT540 days (Table 1). However, WT at specific ages (BWT, WT200, WT360, WT540 and WT720) increased significantly in performance especially at blood level M80 (Figures 1 and 2).

ADG and WT at different ages showed that there were no significant differences at different years of birth for Mafriwal dairy cattle (Table 2).

According to Figure 3, there was an inconsistency in performance of ADGs over the period from 2011 to 2017 due to incomplete data (ND). The mean ADG 200 in 2013 has a higher value 0.41 ± 0.09 kg/day followed by ADG 200 in 2017 which is 0.393± 0.06 kg/day.

The mean weight at different ages (BWT, WT200, WT360, BW540 and BW720) at different year of birth also showed the same inconsistency of performance (Figure 4).

The mean birth weight is 23.68 kg for males and 23.70 kg for females (Table 3), showing no significant differences between mean birth weight for males and females. These values are similar to that reported by the Malaysian Livestock Breeding Policy 2013 with a mean birth weight of Mafriwal being 23 kg.

Each mean ADG for ADG200, ADG360, ADG540 and ADG720 was slightly higher for males than females (Figure 5). The results show that there is no significant differences between ADG of males and females for ADG200, ADG360 and ADG540 but there is a significant difference between mean of ADG 720 for males and females. Results also indicate the range for ADG for the all ADG groups were between 0.33 kg/day and 0.36 kg/day. However, the values were lower compared to the Malaysian Livestock Breeding Policy 2013 of 0.65 kg.

The weight at different ages (WT360, WT540 and WT720) showed a higher value for males than for females (Figure 6). However, at weight of WT200, the mean value of females is higher than the males. There is no significant difference between males and females at these respective weights WT200, WT360 and WT540. However, there is a significant difference between males and female at WT720.

In 2005, Panandam and Raymond reported the need for the Malaysian government to improve the dairy industry in Malaysia, through development of the Mafriwal dairy cattle by crossbreeding of the Friesian and the Sahiwal breeds. However, way before this period in the 1990s, Mafriwal cattle were imported from Australia and were bred in a programme to systematically improve the performance of this breed. Data on production and reproduction performance and health were collected and stored using the DairyCHAMP (computerised dairy herds database system). The performance of the crossbred genotypes with various gene proportions of the Friesian breed was studied. The F1 crossbred animals showed improved milk production, however, the F2 animals exhibited tremendous reduction in lactation

and breeding performance (Sivarajasingam and Kumar, 1989). Furthermore, 60%-70% of the F2 cows failed to milk on the machine. This led to the recommendation of the use of Sahiwal-Friesian crossbred animals with 60%-75% Friesian genes. Consequently, a breeding programme to produce these crossbreds was designed by the Department of Veterinary services whereby the "Mafriwal" dairy cattle of Malaysia is recommended as a tropicalised synthetic dairy breed. The Mafriwal breeding animals were selected for their good dairy production characteristics, based on pedigree records. The influence of the local environmental factors on performance was taken into consideration. The desired characteristics of the Mafriwal include improved milk production, easily manageable, able to withstand the local hot and humid climate, resistant to local diseases and adaptable to the local feed resources. The Mafriwal breeding population has an average milk yield of 2,337 kg/lactation and a lactation length of 260 days. The Mafriwals are currently the most popular dairy cattle in Malaysia for intensive and semi-intensive management systems in medium sized farms. Hence, this study was conducted to evaluate the growth performance from data available. Overall, there was no significant differences in birth weight, ADG and different blood levels although there were small differences in this study evaluating data from 2011 to 2017. The animals were managed routinely and fed with the standard concentrate feed and grass available on the farm. However the data shows interesting trends when blood levels increase. This however requires more observation and a detailed study to evaluate the effects of feeding and management which may have a significant effect on the performance of the animals including the birth weight.

In a study by Mohd Noor Ibrahim (2018), ten Mafriwal cattle were were divided into two groups and fed with diet containing 40% of oil palm empty fruit bunches and 60% concentrate feed. Group A was fed separately while Group B feed was mixed together. The trial was conducted over a period of 90 days and showed no significant differences between Group A and B. At the end of the trial, the average weight, ADG, average dry matter consumption and feed conversion ratio (FCR) of cattle in group A were 60.9 kg, 0.68 kg, 5.7 kg and 10.29, respectively compared to 34 kg, 0.38 kg, 6.10 kg and 16.45 of cattle in Group B. It can be concluded that 40% oil palm empty fruit bunches fed separately with concentrates show better performance for the cattle.

The various studies on feeding and management has shown that Mafriwal cattle could be the right choice for farmers keen on dairy farming taking into consideration that feed is an important limiting factor in the cattle's performance. The performance of the Mafriwal under intensive and semi-intensive management systems should be evaluated in comparison to other popular breed types. Since the Mafriwal has 60%-75% Friesian genes and is still being improved, it is important that its genetic make-up and performance be monitored.

CONCLUSION

This study indicates that there is no consistent and significant improvement

of growth performance of Mafriwal dairy cattle at Institute Haiwan in Kluang, Johor. The inconsistency in performance of ADG and WT during the period studied shows that other than genetic factors, there could be other factors such as feeding and management which may have influenced the growth performance of Mafriwal dairy cattle. A lack of research studies in comparing the performance of Mafriwal under the various production systems, has also contributed to the Mafriwal population in this farm being static in performance. Further studies on the effects of feeding as well as other contributive factors such as concurrent disease needs to be conducted so that steps to enhance the population can be taken in order to upgrade its performance.

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