PERFORMANCE OF WAGYU ANGUS CROSS CATTLE FROM BIRTH TO SLAUGHTER

JOHN F GRAHAM[1], SHELLY M HALL[2] AND ALLAN J CLARK[1]

Dept of Agriculture, PVI, Private Bag 105, Hamilton, Vic. 3300
[2]VCAH, Dookie Campus, Dookie, Vic. 3647

SUMMARY

The growth performance and carcass characteristics of 21 Wagyu Angus cross (WX) steers (M) and heifers (F) were compared to 19 Angus (A) steers and heifers. The cattle were compared from birth to weaning, and to slaughter (at 29 mths), after being fed in a feedlot for 103 days. Both the W and A groups were bred from lines of Angus cattle that had been selected since 1975 for either high (H), or low (L), growth rate to yearling age.

There were no significant differences in birth, weaning or 600 day weights, between the WX and A cattle, however there were some differences in these measurements due to line and sex. Breed did not affect feedlot growth rate, but the H line and M cattle grew faster than the L and F cattle respectively ($P<0.05$). Females were significantly ($P<0.05$) fatter than steers. Marbling score was significantly higher in the WX cattle than the A cattle (2.8 vs 2.0) ($P<0.05$), but there were no other significant differences in carcass measurements due to breed. The P8 carcase fat depth of the H and F cattle was significantly greater than that of the L and M cattle (25.7, 27.4, 21.4 and 19.6mm respectively). There was no difference in conformation score due to either breed, line or sex.

INTRODUCTION

The Wagyu breed has been introduced into the Australian cattle industry in the hope that it will improve the quality of meat destined for the Japanese market, particularly marbling. Many producers believe that the Japanese minimum specification for marbling score of 2 means a fat animal, that would not meet the domestic grade. However, the Meat Research Corporation's Japanese and Korean market program coordinator, Greg Chappell, states that a marble score of 3 equates to 7-9% of fat in the meat. This receives the National Heart Foundation approval as a low fat product. Therefore, a specification for a marbling score of 2 does not necessarily mean the market requires fat meat. In the future, it is possible that a marbling score of 2 will be required for all markets (including the domestic supermarket trade) to ensure consistent taste and quality, and to counteract the consumers inability to cook meat correctly (Francis 1994). Chappell (1994) indicated that approximately 150,000 tonne of grain or $22.5 million (@ $150/tonne) are wasted on feedlot cattle that do not have the genetic potential to meet the marbling specifications of the Japanese market. The Wagyu genotype may offer producers the opportunity to overcome quality problems, while decreasing the above wastage and gaining the premiums paid for higher marbling beef. This paper reports studies carried out on the growth rates and carcass characteristics of Wagyu Angus cross cattle compared to straightbred Angus.

MATERIALS AND METHODS

In 1991 Angus females from lines of cattle that had been selected for either high (H) or low (L) growth rate from birth to yearling age since 1975 (Parnell 1994), were joined in June by artificial insemination to 3 Wagyu sires (Sencho [S], Sir lee [L] and Kuro kin [K]) at random. Angus females from both lines were randomly joined to 8 Angus sires from their respective lines. During pregnancy all females were grazed together. At calving all male progeny were castrated and all calves tagged, and the dams continued to be grazed together. After weaning at around 9 months of age, the 19 Wagyu x Angus (WX), and 21 Angus (A) progeny were grazed together until April 1994 (at 24 months of age) when they were separated into groups according to sex, (M and F), line (H and L) and genotype (WX and A).

The eight resultant groups were then kept in separate adjacent feedlot pens and fed a ration consisting of cracked triticale grain and pasture hay (average crude protein of 10.8% and 12% respectively, and digestible dry matter of 86.8% and 82% respectively). This ration was supplemented with 1% Urea, virginiamycin (Stafac 20 - Smith Kline) at 20 parts per million, and sodium bicarbonate at 1.7%. This supplement was introduced 47 days after the commencement of feeding to alleviate some problems that were being encountered due to acidosis. The ratio of grain to hay was approximately 70:30, with the initial ration fed being calculated at 2.5% of liveweight for each treatment group.

The cattle were weighed fortnightly prior to being fed, and the ration was adjusted accordingly. The cattle were fed daily in feed bunkers situated at the front of each feedlot. All groups were in the feedlots for 103 days, and then slaughtered at an AUS-MEAT accredited export abattoirs, and a full AUS-MEAT assessment of the carcasses made. This included hot standard carcass weight, dressing %, fat depth at the P8 site, marbling score, fat colour, meat colour and conformation score.

RESULTS AND DISCUSSION

Liveweights of the different groups from birth up to 20 months of age are shown in table 1.

Table 1 Mean calf birth weight (Bwt)(kg), 280 day adjusted weaning weights (Wwt)(kg) and liveweight at 600days (Lwt)(kg), of the different groups of cattle, classed as:- breed - WX or A, line - H or L, and sex - M or F, with the number (n) of animals and Wagyu sires (WSire)(n) used in each group

Group	n	WSire(n)	Bwt	Wwt	Lwt	Class	Bwt	Wwt	Lwt
WX.H.M	5	L(3)K(2)	32.2ab	238b	447.2de	WX	30.0	226	401
A.H.M	5		32.2ab	242b	468.4e	A	31.1	221	390
WX.H.F	4	L(1)K(1)S(2)	29.8ab	221ab	382.5bc				
A.H.F	6		33.8b	236b	406.0cd	H	32.0	234b	426a
WX.L.M	4	L(2)K(2)	30.1ab	228b	419.5d	L	29.1	212a	366b
A.L.M	4		31.3ab	214ab	367.0bc				
WX.L.F	6	L(4)K(2)	27.9ab	216b	356.5ab	M	31.4	231	426a
A.L.F	6		27.0a	191a	320.0a	F	29.6	216	366b

Bwt LSD range = 5.2 - 6.3; Wwt LSD range = 27.9 - 34.2, Lwt LSD range = 37.2 - 45.6($P<0.05$)
For mean effects of Line, Breed and Sex ($P<0.05$), LSD's for Bwt = 2.9, Wwt = 19.6 and Lwt = 20.7.
Within columns figures with different postscripts differ ($P<0.05$)

The results were analysed by regression because of unequal group numbers. Apart from the main effects of breed, line and sex, a range of LSD's is reported for each measurement, the maximum LSD for each measure, giving a conservative test of significance.

The figures in Table 1 show that there was no significant differences between the means in the different categories of breed, line and sex at birth, however by weaning the L line cattle were significantly lighter than the H line (P<0.05). There were significant differences between some of the individual groups. The A.L females were significantly lighter at birth and at weaning than WX and A H males, and the A H females. The WX L females were significantly lighter at birth than the A H females. A significant breed x line interaction (P<0.003) occurred with Lwt, the WX L cattle (388kg) being heavier than the A L cattle (343kg), and the WX H cattle (415kg) being lighter than the A H cattle (437kg). If 5% heterosis is allowed for the 600day weight, pure Wagyus are predicted to fall between the H and L line Angus, weighing around 385Kg. It is worth pointing out that by current industry standards, H line cattle are only moderately sized Angus and L line cattle are very small.

The results of the feedlot feeding phase are shown in Table 2. There was no significant difference in either mean liveweight change (LwCh), final liveweight (FLwt), or live animal fatness at the P8 site due to the main effect of breed. The H line cattle had higher growth rates and heavier final liveweights than the L line cattle (0.85 and 550 and 0.70kg/day and 472kg respectively)(P<0.05). The A.H.M group of cattle grew significantly faster (1.13kg/d) than all but the WX H M cattle. The only significant difference due to breed alone occurred in the L line M groups where the WX cattle were heavier than the A cattle (547.7 and 471.3 kg respectively)(P<0.05).

Table 2 Liveweight change during feedlot feeding (LwCh)(kg/hd/d), final liveweight (FLwt) (kg) and final P8 fat depth (live) (P8) of the different groups of cattle classed as:- Breed - WX or A, line - H or L, and sex - M or F.

Group	LwCh	FLwt	P8 fat	Class	LwtCh	FLwt	P8 fat
WX.H.M	0.9bc	579d	14a	WX	0.8	517	19
A.H.M	1.1c	617d	17ab	A	0.8	505	19
WX.H.F	0.7a	487.3bc	25c				
A.H.F	0.7a	515bc	23bc	H	0.9a	550a	20
WX.L.M	0.8ab	548cd	16ab	L	0.7b	472b	18
A.L.M	0.7ab	471ab	13a				
WX.L.F	0.6a	452ab	20abc	M	0.9a	554a	15b
A.L.F	0.6a	416a	22bc	F	0.6b	467b	22a

LwCh LSD range = 0.19 - 0.23; FLwt LSD range = 50.1 - 61.4; P8 fat LSD range = 5.7 - 6.9 (P<0.05) For mean effects of Line, Breed and Sex (P<0.05) LSD's for LwCh = 0.11, FLwt = 27.9 and P8 fat = 3.2. Within columns, figures with different postscripts differ, using the maximum LSD in the range (P<0.05)

The comparative carcass measurements are shown in Table 3. Carcass weights generally reflected the previous differences in animal liveweight, with significant differences occurring due to both line and sex. The only significant difference (p<0.05) due to breed only, were the heavier carcass weights (298kg) of the WX.L M cattle compared to the A.L M group (252kg), and the higher marbling score of the WX cattle (2.8) compared to the A group (2.0)(P<0.05). For AUS-MEAT marbling scores of 1, 2, 3, 4, 5 the percentage of WX and A cattle that fitted each score was 5.3, 31.6, 47.4, 10.5, 5.2 and 23.8, 52.4, 23.8, 0 and 0 respectively. There were no significant differences in either fat or meat colour, or conformation score.

Table 3 Carcass weight (Cwt) (kg), dressing percentage (Dr%), carcass fat depth at the P8 site (Fat) (mm) and marbling score (Marb)(Score range from 0-12) of the different groups of cattle classed as:- Breed - WX or A, line - H or L, and sex - M or F

Group	Cwt	Dr%	Fat	Marb	Class	Cwt	Dr%	Fat	Marb
WX.H.M	313f	55.2	19a	2.6ab	WX	278	55.3	24	2.8a
A.H.M	324f	54.4	21a	2.4ab	A	268	55.1	23	2.0b
WX.H.F	261bcd	55.6	32bc	3.0b					
A.H.F	273cde	54.7	31b	2.2b	H	293a	55.0	26a	2.5
WX.L.M	298ef	56.2	21a	2.5ab	L	253b	55.5	21b	2.2
A.L.M	252abc	55.9	17a	1.8a					
WX.L.F	238ab	54.4	24ab	3.0b	M	297a	55.4	20a	2.3
A.L.F	223a	55.4	23a	1.7a	F	249b	55.0	27b	2.5

Cwt LSD range =27.9 - 34.1; Dr% LSD range =1.6 - 2.0; Fat LSD range = 6.2 - 7.6; Marb LSD range = 1.0 - 1.2 (P<0.05). For mean effects of Line, Breed and Sex (P<0.05), LSD's for Cwt = 15.5, Dr% = 0.9, Fat = 3.4 and Marb = 0.6. Within columns, figures with different postscripts differ, using the maximum LSD in the range (P<0.05).

These results indicate that the use of Wagyu semen/bulls in the current commercial beef industry may produce progeny that are slightly lower in body weight than original genotype, depending upon the mature size of the cattle used. However the Wagyu Angus cattle achieved higher marbling scores than the Angus cattle with only a small loss in carcass weight. Growth rates achieved in the feedlot phase indicated that there was little difference between the genotypes. Using the scale of weight differences found between the WX H and A H cattle (the H cattle were closer to the industry average, than the L line), the added benefit of the higher marbling score for cattle produced for the Japanese market ($68/score increase - Hygate 1994) would outweigh any liveweight disadvantage. These results agree with those of Lunt et al (1993), who found that Wagyu Angus cross cattle produced marbling scores that were significantly higher than purebred Angus, with no loss in other carcass quality attributes. Lunt et al showed however that the Wagyu cattle were slightly less efficient, and grew slightly slower in the feedlot. Because of the premium paid for high marbling scores, and the difficulty of many feedlots to meet the Japanese carcass quality requirements using existing genotypes (Chappell 1993), the Wagyu genotype could be of considerable value to the current beef industry.

REFERENCES

CHAPPELL.G. (1994) *Beef improvement news* **19**: V 12.
FRANCIS..P. (1994) *Australian Lotfeeders' Association, July-August*, 1994.
HYGATE L.C, BAUD,S, and GODDARD,M.E A Aust.J.Agric.Research (1994)(in press)
LUNT D.K., RILEY R.R and SMITH S.B. (1993) *Meat Science* **34**:327-334
PARNELL P.F. (1994) *Proc.Aust.Soc Anim.Prod* **20**:17