WAGYU BEEF PRODUCTION IN AUSTRALIA

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ABSTRACT

Australian production of Wagyu beef is focused on export markets in Japan and China. For this market marble score and carcass weight determine the price received, and therefore are the primary attributes selected for. Australian production systems make use of available land for grazing. Cows and calves are grazed on pasture with little supplementation until the calves are 4 to 6 months old. In this context, traits for milk, growth and hardiness are also important and can be accessed through cross breeding.

Australian consumers are health conscious and beef consumption has been dropping, based on health warnings against its saturated fat content. When purchasing raw beef for home consumption health conscious consumers have chosen lean beef. Red and black Wagyu can be sold in this market at a premium based on a higher proportion of mono unsaturated fats. Melting temperature can be measured easily and is an excellent indicator of the saturated fat ratio and thus the healthiness of beef fat. We have compared fat samples of various European breeds crossed with Red and Black Wagyu. The beneficial effects of Wagyu ancestry on fatty acid composition are seen at the first cross, even with less than 100 days on feed.

Further research will identify specific genetics that support high marbling and low melting point fat within full blood, pure bred and cross bred populations. Production systems also influence fat deposition with myths and secrets surrounding advice on the best diets to optimize marbling. Controlled trials with paired animals, matched for genetics and early growth rate, will shed light on how these feeds effect fat deposition and fatty acid composition.

Keywords:

INTRODUCTION

Australian production of Wagyu beef is focussed on export markets in Asia and, for premium product, Japan and China. For this market, marble score and carcass weight determine the price received and are therefore the primary attributes for selection. However, there is no agreed and standardised system for the accurate measurement of marbling.
RESULTS AND DISCUSSION

MEASURING MARBLING
In Australia, an inspector compares the appearance with a card although some centres are now also using the KUCHIDA camera (Kuchida et al., 2000). DEXA scanning is also being assessed. We and some of the leading breeders use the melting temperature of fat (Lloyd et al., 2014) as discussed below, since the measurement is precise, accurate, genetically determined (Lloyd et al., 2017) and relevant to health as well as taste.
To compound the problems for the importer of Australian Wagyu, different scales are used. Therefore, at the present time, marble scores should be used to rank samples from one supplier but should not be the basis of comparisons between different suppliers.
Ultimately, each importer, whether of embryos, live or boxed Wagyu, must be guided by consumer preference. Extreme marbling by any measure is in demand in elite settings but modest and even minimal marbling is growing very rapidly based on consumer demand in our own experience. We expect that there will be substantial growth in the demand for lesser degrees of marbling as the consumer becomes more cost and health conscious.

INFLUENCE OF DIFFERENT ENVIRONMENTS
Australian production systems make use of differing landforms for grazing. Cows and calves may be grazed on pasture with little supplementation until the calves are 4 to 6 months old. In this context, traits for milk, growth and hardiness are critically important and are often accessed through cross breeding. In different regions, the cross breeding will be based on the performance of the mother. This is the explanation for the various F1 crosses with Friesian, Angus, Simmental, Shorthorn or, in Northern regions, Bos Indicus sub-breeds such as Santa Gertrudis, Droughtmaster and others. It appears that all cross breeds can marble to various degrees, including Brahman, but the proportion depends on the ancestry of the bull and dam. Some breeders have managed to find the right balance between a hardy, locally adapted mother and a bull which is penetrant with such dams.
Our research is addressing such issues. We know (Lloyd et al. in press) that the 60.1 haplotype is penetrant in full-blood and Angus F1s, but there is more to do and we are willing to support scholarships and fellowships which are relevant to finding the appropriate balances for Asian markets especially if they involve expertise in genomics.

HEALTH
Australian and American consumers are health conscious. Through completion with other species, beef consumption has been dropping based on health warnings against its content of saturated fat. When purchasing raw beef for home consumption health conscious consumers have chosen lean beef. Red and Black Wagyu can be sold in this market at a premium based on a higher proportion of mono unsaturated fats. Melting temperature can be measured easily and is an excellent indicator of the saturated fat ratio and thus the healthiness of beef fat. We have compared fat samples of various European breeds crossed with Red and Black Wagyu. In terms of healthy fatty acid composition, the beneficial effects of Wagyu ancestry are seen at the first cross, even with less than 100 days on feed see Figure 1.

FEEDING, CONDITIONS
Further research will identify specific genetics that support marbling and low melting point fat within full blood, pure bred and cross bred populations. Production systems influence fat deposition in keeping with the myths and secrets surrounding advice on how to produce the best diets to optimise marbling. Controlled trials with matched pairs to compare regimes which will produced desired amounts of fat deposition, fatty acid composition and consumer satisfaction. It is highly predictable that battery or lot feeding will become increasingly unacceptable. We have compared different feeding situations and can show that happy cattle grow faster. Whether their melting temperature falls in parallel with their preferred environment is another question to be addressed by a PhD project.

BLACK versus RED/BROWN/AKAUSHI versus HANWOO
These Asian breeds have evolved the ancestral haplotypes which carry the alleles on region of Bota 19 which includes the many genes responsible for marbling and healthy beef (Williamson et al., 2011, Lloyd et al., 2013). We assert this fact without having been able to test Hanwoo and hope that this meeting will lead to the availability of comparisons of the relevant Hanwoo DNA so as to complete the matrix. To date, we have shown that black and red wagyu are distinct breeds (shown in Figure 2) but also similar, no doubt reflecting a common origin from Mongolian/ Hanwoo cattle. The fact that black and red marble implicates the MRIP-TCAP region but the fact that reds do enough on grass suggests that we need to understand the interactions between the different alleles and the
environment. We have shown that red F1s can lower Tm quickly and are therefore preferable to blacks. A similar analysis of Red and Black Wagyu compared to Hanwoo would be very exciting for us and, no doubt, of great interest to all of you.

CONCLUSION

There are many questions remaining on the interactions between breed, haplotypes and optimal feeding conditions. These are best addressed after defining the consumers' preference. To that end, we recommend offering a range of marbling or, in terms of melting temperature, choices between 33 and 38 Celsius.

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REFERENCES


Table 1. Higher Marble Score in F1 and F2 Wagyu with wagyu specific haplotypes compared to bos indicus specific haplotypes.

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<th>Average MS</th>
<th>N</th>
<th>SEM</th>
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<tr>
<td>Bos Indicus Haplotypes</td>
<td>4.2</td>
<td>6</td>
<td>0.54</td>
</tr>
<tr>
<td>Wagyu Haplotypes</td>
<td>5.3</td>
<td>22</td>
<td>0.22</td>
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*Cross bred and pure bred Wagyu fed for 450 days marbling assessed visually between the 10th and 11th rib, using the AUS-Meat marble scale.

Haplotypes classified as Bos Indicus specific were those with MRIP > 60 or NT5M > 22.

Haplotypes classified as wagyu specific were 60.10.S.10, 30.20.S.20 and 30.10.S.20.

Haplotypes were determined for SREB to TCAP markers by a combination of pedigree analysis, homozygosity and breed based haplotype frequencies. For simplicity animals with neither a Bos Indicus specific nor a wagyu specific haplotype have been excluded from the table.
Fig. 1. Tm was measured for subcutaneous fat samples taken from the strip loins of 243 carcasses. The cattle were backgrounded on pasture and then fed on pellets until they reached a satisfactory weight and fatness. The results are grouped by days on feed and by breed of sire (European or Akaushi). The dams of all carcasses were similar European breeds.

Fig. 2. "W Plot" showing differences in haplotype frequencies between red and black wagyu. The most common haplotypes of red and black wagyu, 60.7 and 60.1 respectively, have similarities in the MRIP – TCAP portion of the haplotype, but differences in the SREB-NT5M end of the haplotype.