Fact sheet – Lamb Nutritional Value

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Consumers demand lamb meat that is lean, palatable and has a good nutritional value. Nutrients such as iron and zinc are important for human health and represent a key marketing tool for red meat.

Current levels and targets

Nutrient levels need to account for 10% or 25% of the recommended daily intake to achieve a source or good source claim from one serving of food*. One serve of lamb is considered to be 135g of fresh meat.

Table 1: Mineral concentration in INF lambs. * FSANZ Food Standard 1.2.7 – Nutrition, Health & Related claims

Mineral*	Average	Range
Iron	2.0 mg/100g	0.8-4.0 mg/100g
Zinc	2.4 mg/100g	1.2-4.5 mg/100g

Based on the average level of iron and zinc of the Sheep CRC Information Nucleus flock (INF) (Table1), Australian lamb can predominantly be claimed as a good source of iron and zinc. However there is still room for improvement, because a good source claim cannot be made for iron in younger women and zinc in all men.

Physical associations with iron and zinc

Data from the INF lambs has shown a range of non-genetic factors that are significantly associated with the iron and zinc content in muscle.

Slaughter age

Age is a key driver of iron and to a lesser extent of zinc. The mean slaughter age from the INF lambs measured for iron and zinc is 268 days, with a range of 134–504 days. Across this range, both iron and zinc increase by 0.75 and 0.57 mg/100g (Figure 1).

Age also impacts on the muscle oxidative capacity, with older animals having been associated with a more oxidative, redder muscle fiber type. This is reflected through higher levels of the protein myoglobin which is the key red pigment of muscle.

Figure 1: Iron and zinc concentration increases with slaughter age.

Myoglobin

Myoglobin is an indirect indicator of muscle oxidative capacity, with higher levels of muscle myoglobin causing redder meat (Figure 2).

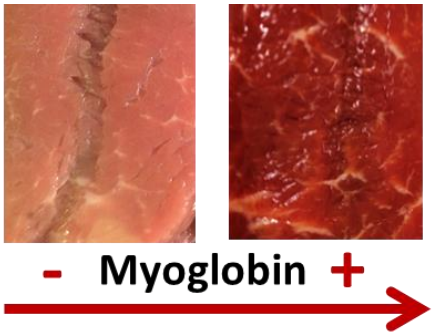

Figure 2: Light lamb loin colour versus red lamb loin differing in myoglobin levels.

Both iron and zinc increase as myoglobin increases, however the effect was three times bigger for iron than for zinc given its direct association with haem-iron. The mean myoglobin from the INF lambs tested for the minerals is 6.6 mg/g, with a range of 2–13 mg/g.

Intramuscular fat percentage (IMF%)

Both iron and zinc levels increase with higher IMF% levels. The mean IMF% is 4.2%, with a range of 2–7%. IMF% is also associated with myoglobin which increases with higher IMF% levels.

This highlights the concerns that selection for lean meat yield, which reduces IMF% and the proportion of oxidative fibres, might subsequent reduce iron and zinc concentrations.

Genetic associations

Minerals - iron and zinc

Both iron and zinc have a low to moderate heritability, as does myoglobin. Consistent with the phenotypic associations, both minerals have a positive genetic correlation with IMF% and myoglobin. Myoglobin also has a positive genetic correlation with colour stability and colour redness.

Sire

Meat from Terminal sired lambs had the lowest iron levels compared to Maternal and Merino sired lambs, reflecting the more intense selection pressure for more muscular and leaner animals, note that these lambs are also older. Terminal sired lambs have also been shown to have less myoglobin which in part may be associated with their lower mineral levels.

Sire breeding values

Lean meat yield selection using sire Australian Sheep Breeding Values (ASBV) has some impact on the nutrient content in muscle.

Selection for leaner animals reduces the iron content (Figure 3), but does not impact the zinc levels, whereas selection for more muscular animals had no impact on both minerals. This confirms the minimal impact that selecting for lean meat yield would have on these nutrients.

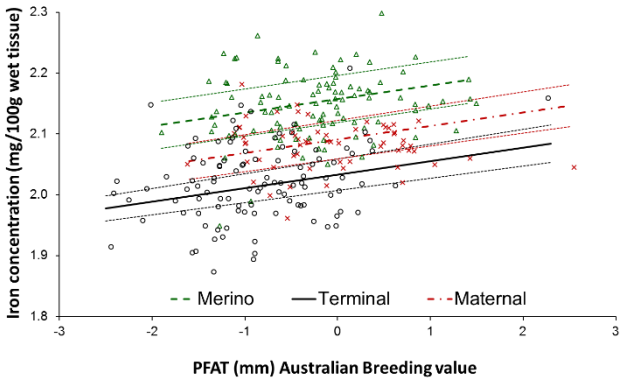

Figure 3: Effect of fat depth (PFAT ASBV with iron.

Furthermore it has been shown that selection for lean meat yield reduced oxidative capacity via reduced myoglobin levels.

Key Messages

Lamb contains substantial concentrations of iron and zinc, however there is some room for improvement. Iron and zinc increase with age and IMF%. Care must be taken to avoid lower levels. Selection for lean meat yield reduces IMF% and oxidative muscle fibres, possibly lowering iron and zinc levels.

Further information

- Sheep CRC Information Nucleus: http://www.sheepcrc.org.au/genetic/summary-of-progress-in-genomics-and-genetics/information-nucleus.php
- AMPC Fact Sheet: Intramuscular fat

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