INTRODUCTION

Meat which is frozen and thawed will undergo physical and chemical changes. The rate at which meat is frozen could affect quality. Properly frozen retail cuts may allow retailers to extend shelf life and take advantage of wholesale price fluctuations. In South Africa consumers tend to buy meat in bulk to freeze at home but do not trust frozen meat on the shelf.

OBJECTIVE

To compare method of freezing on meat quality of beef steaks.

METHODS

Twenty one loins (M. longissimus lumborum) aged for 14 days, processed into 25 mm steaks, vacuum-packed. Three treatment groups:

- Fresh – Control.
- Slow frozen – domestic freezer for 24h reaching -20°C core temperature (Fig. 1) – Consumer.
- Quick frozen – blast freezer for 3h reaching -35°C core temperature (Fig. 2) – Commercial.

Parameters studied:

- Colour properties (L*, chroma, hue, oxymyoglobin, deoxymyoglobin and metmyoglobin).
- Water holding capacity (WHC; pressed out water), drip/thawing loss.
- Warner Bratzler Shear Force (WBSF).
- Sensory attributes (flavour, aroma, juiciness, overall tenderness).

Samples for every parameter were randomly taken from each loin so that each parameter had a sample number of n=21.

RESULTS

Drip/thawing loss and water holding capacity:

- Both freezing groups recorded twice as much thawing loss compared to the drip loss of fresh samples (Fig. 3).
- No significant difference between two freezing methods.
- No significant difference for WHC between any of the groups.

Colour:

- Frozen and thawed samples reflected less light (lower L*) than fresh samples (Fig. 4).
- Lower chroma and higher hue angle values for frozen samples were accompanied by higher levels of metmyoglobin (MetMb) and lower levels of oxymyoglobin (OxyMb) compared to fresh samples (Fig. 4 and 5).
- No differences in colour attributes recorded between two freezing methods.

Tenderness:

- Lower WBSF recorded for both freezing methods (P<0.001) compared to fresh samples (Fig. 3).
- Sensory tenderness did not support differences in WBSF among treatments.

Other sensory attributes:

- No differences for aroma, flavour, juiciness and residue recorded among treatments.

CONCLUSION

- Freezing vs. Fresh: Meat with poorer visual quality and excessive drip but possibly more tender meat.
- No effect on quality due to differences in freezing rate.
- Eating quality of properly frozen meat, domestic or industrial, should not differ from fresh meat.
- On retail level, consumer resistance will have to be overcome to sell frozen meat successfully.