

TRACEABILITY SYSTEMS AND ORIGIN BASED MEAT PRODUCTS IN THE SOUTH AFRICAN SHEEP MEAT INDUSTRY

Melissa van der Merwe and Johann F. Kirsten

Agricultural Economics, Extension and Rural Development Department, Faculty of Natural and Agricultural Sciences, University of Pretoria, Pretoria, South Africa

Abstract – In a consumer driven world consumers want to experience a connection between the product that they are consuming and the origin of that product. To guarantee the validity of this connection and therefore the product's origin attribute, traceability systems are required. The main purpose of this paper is to assess current traceability systems implemented in South African sheep abattoirs thereby establishing their ability to guarantee the origin of a carcass. Research indicated that the South African sheep abattoirs have traceability systems in place and can guarantee the origin of a meat product. The descriptive analysis and hypothesis tests identified the tipping factor for the implementation of a traceability system, as the requirement from retail markets to which abattoirs deliver their product.

Key Words – Karoo lamb, Origin based foods, South African abattoirs, Traceability

• INTRODUCTION

One of the latest trends in the market for food products is the desire amongst consumers to know the origin of the food product they purchase and to be physically or emotionally connected to the farm and the producer. This consumer need for origin based food is now playing out in a variety of ways as food processors and retailers are labelling their products according to the origin of the product. Quite often regional names are used for that identification. In order for the origin and history of a food product to become evident a transparent supply chain is needed [1]. However, in order for a supply chain to become transparent, traceability systems need to be in place. Traceability is therefore a proactive approach to create, maintain and share the information trail that follows the path of a product throughout the production process to ensure a transparent, traceable supply chain.

One iconic South African example of a product with regional identity is Karoo Lamb. The Karoo is the large semi-arid area stretching north-eastwards from the Cape and covers almost 50 % of the total area of South Africa. The region is typically flat, dry shrub land with grass growth restricted by rainfall in the region. The Karoo shrubs provide a distinct taste to the sheep meat. The diet of the Karoo reared sheep, in combination with the nostalgic image and reputation of the Karoo, is what makes the concept of Karoo Lamb most sought after [2].

One famous example of an origin based meat product is *Prosciutto di Parma* (Parma Ham). The production of Italy's *Prosciutto di Parma* has a long tradition of excellence. The region of Parma in Italy, is a region defined by the hills around it and has dry, uniquely sweet, aromatic breezes from the Apennine Mountains. This creates the perfect environmental conditions for the natural drying process of the hams. The unique characteristics of the Parma region therefore present important reasons for protecting the identity of *Prosciutto di Parma* [3]. The *Prosciutto di Parma* label therefore carries the message of quality Parma Ham from Italy, produced by using traditional production methods. The intensive chain-wide traceability system guarantees the quality, origin and traditional production methods of *Prosciutto di Parma* to effectively safeguard the interest of consumers.

From the aforementioned it is clear that traceability systems play an integral part in a product with origin as a credence attribute. To be able to guarantee the origin of the product to the consumers, all members of the supply chain should have proper traceability systems in place.

The objective of this paper is to assess current traceability systems in the South African sheep abattoirs and to establish their ability to guarantee the origin of the carcass. This traceability system should be able to protect, manage and govern the food of origin attributes of a meat product in the sheep meat industry. The paper develops a detailed description of current traceability systems implemented and investigates the decision making factors impacting on the implementation of a traceability system at the abattoir level. Five hypotheses were developed; aimed in identifying the tipping factor in the traceability implementation decision making process at the abattoir level.

• MATERIALS AND METHODS

A random sample of 55 abattoirs from the total population of 284 sheep abattoirs listed at the South African Red Meat Abattoir Association (RMAA) was drawn to participate in the study. Of the 55 abattoirs only 39 were operational and willing to participate in interview-administered interviews based on a structured questionnaire.

The Fisher's exact test was used for data analysis. This test is specifically developed for exact inference on small samples; only 39 South African abattoirs in the sample. The null hypothesis of this test is one based on independence; the relative proportions of one variable are independent of the second variable.

The five identified hypotheses that could possibly affect the implementation decision of traceability systems at the abattoir level are:

- The presence of a traceability system is independent of abattoir size
- The presence of a traceability system is independent of the abattoir's capital investment
- The presence of a traceability system is independent of the abattoir's outlet market
- The presence of a traceability system is independent of the presence of a Hazard, Analysis and Critical Control Points (HACCP) system in the abattoir.
- The presence of a traceability system is independent of vertical integration in the supply chain

• RESULTS AND DISCUSSION

South African sheep abattoirs are on average 26 years old, with some being around since 1927. The high capital investments of these abattoirs require the maintenance of high profit margins, and therefore high slaughtering capacities. The RMAA classifies abattoirs into low (slaughtering 12 to 120 sheep/day) and high (slaughtering 120 to 600 or more sheep/day) throughput abattoirs. Due to the fact that many of the abattoirs increased their capacity to well above the 600 unit mark, a very high (more than 600) throughput category, was added during the study (Fig. 1).

Figure 1. Capital replacement and capacity

Of the abattoirs, 87% are privately or independently owned and 84% are vertically integrated (Fig. 2). In some cases abattoirs owned both a sheep farm/feedlot and butchery.

Figure 2. Level of vertical integration

The bulk of carcasses sold by abattoirs are destined for wholesalers (42%), followed closely by butcheries (31%) and retailers (24%).

An overview of traceability systems implemented by abattoirs

Figure 3 illustrates the different types of traceability systems that are in place at the abattoir level; Abaserve, Meat Matrix, Beef Tech, Excel or paper based systems. It was noted that high throughput abattoirs are more likely to have electronic traceability systems in place.

Figure 3. Traceability systems at the abattoir level

A common opinion amongst the abattoirs is that traceability systems are currently used for inventory management and not so much to guarantee certain quality claims or to ensure food safety. These abattoirs identified the key drivers for the implementation of traceability systems throughout the sheep supply chain as; retailers, consumers and the South African government.

Of the surveyed abattoirs 82% was of the opinion that traceability systems will become an inevitable part of the sheep meat industry's future.

The economics of traceability systems in meat supply chains

Only 33% of the abattoirs knew exactly what their traceability costs are. From the study it can be concluded that, a typical abattoir with a slaughtering capacity of 1000 sheep per day, that has a traceability system such as Abaserve in place, spend approximately R70 000 (USD 8540) start up fees on hardware and software to get the system in place. Thereafter R5 000 (USD 610) per annum are spent on the licencing fees for the Abaserve system.

The abattoirs indicated that, given the choice, they will not have traceability systems in place. The reason? The majority (97%) of the abattoirs feel that the South African abattoirs are the sole carriers of the cost to implement a traceability system in a supply chain whilst 75% of these abattoirs feel that the benefits mostly befall the South African consumer. The question; "Why implement traceability systems when all the costs but very few of the benefit befall you?" was then raised. The answer given was that it is a requirement to supply the retail market.

The general feeling among abattoirs was that retailers use the requirement of traceability systems as a market entry barrier. The study found that 95% of the abattoirs that deliver to retailers admitted that they have traceability systems in place purely because it was a requirement to supply to retailers. These abattoirs are of the opinion that retailers use the presence of a traceability system as assurance that all other quality and hygiene management systems are in place. This selection process eliminates small abattoirs that are not financially capable and/or does not have the necessary expertise to successfully implement traceability systems, even though these abattoirs have quality and hygiene management systems in place.

It was however noted that some retailers, especially those in remote areas where abattoirs are few and far between, do not follow this 'unwritten rule' as strictly as their urban counterparts. This might be as a result of the type of customer that the specific retailer caters for or it can be because the retailer in the rural area has less bargaining power compared to the retailer in the urban area and has no alternative other than to buy from the closest abattoir.

Testing the link between abattoir characteristics and the presence of traceability systems

Of the five tested hypotheses, only one prevailed. The idea that the abattoirs supplying to the retail market influence the implementation of a traceability system at the abattoir level, was supported by the Fisher's exact test. The conclusion drawn for hypothesis 3 was that the implementation of a traceability system is dependent of the fact that abattoirs supply carcasses to the retail market. The descriptive statistics act as further confirmation of this statement; 95% of retail delivering abattoirs had traceability systems in place, the other 5% of abattoirs were abattoirs situated in remote rural areas. Retailers in these areas do not have access to alternative suppliers and meat is therefore bought from these rural abattoirs regardless of the presence of a traceability system.

• CONCLUSION

During the study it was decided to compare Italian *Prosciutto di Parma*, a well-known origin based meat product with the new kid on the block; South African Karoo Lamb to enable the reader to conceptualize the importance of a traceability system in an origin based meat product's supply chain. In a study done by Bulut and Lawrence [4] abattoirs and meat processing plants were identified as the weak links when it comes to traceability. It was therefore decided to start the investigation of the presence of traceability systems at the South African sheep abattoir level to establish the readiness of the abattoirs to be able to guarantee the origin of a product like Karoo Lamb.

It was conclusively found that the South African sheep abattoirs have the ability to guarantee the origin of a meat product such as Karoo Lamb by means of their traceability systems. From the data gathered it was clear that the majority of the abattoirs have proper traceability systems in place that makes it possible for these abattoirs to at least distinguish between batches from different farmers and therefore possibly different regions.

At the abattoir level the traceability systems are quite easily implemented; it is much easier to trace a single carcass in an abattoir than to trace different pieces of one carcass in the processing plant. Downstream tiers were therefore identified as possible weak links in the traceable sheep supply chain. Further research is already underway to evaluate the other role players in the sheep meat industry for chain wide traceability systems in order to test the readiness of this chain to guarantee the origin of a product like Karoo Lamb.

ACKNOWLEDGEMENTS

M. van der Merwe and J. F. Kirsten would like to thank the Bill and Melinda Gates Foundation for financial assistance. The authors would furthermore like to express their gratitude towards the Red Meat Abattoir Association for their willingness to share the information of their members with the researcher.

REFERENCES

- Trienekens, J. H. & Beulens, A. (2011). Boundaries for transparency in food chains. In proceedings of the System Dynamics and Innovation in Food Networks Forum, IGLS (Austria), 14-17 February 2011.
- Kirsten, J. F., Troskie, D., Vermeulen, H., Schönfeldt, H. C. & Bramley, C. (2008). The potential for Karoo Lamb as origin based meat and a Geographical Indication. Research Report, Department of Agricultural Economics, Extension and Rural Development, University of Pretoria, South Africa.
- Prosciutto di Parma. (2012). History. http://www.prosciuttodiparma.com/en_UK/prosciutto/history [Accessed: 2012-05-15].

- Bulut, H. & Lawrence, J. D. (2007). Meat slaughter and processing plants' traceability levels evidence from Iowa. In Proceedings of the NCCC-134 Conference on Applied Commodity Price Analysis, Forecasting and Market Risk Management, Chicago. <http://ageconsearch.umn.edu/bitstream/37576/2/confp20-07.pdf>