Red meat price transmission analysis

Mr Frikkie Marais MSc

Mr Herman Lombard MSc

Research Institute:	**Department of Agricultural Economics, University of the Free State**
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Price transmission in the red meat value chain - The case of Bloemfontein, South Africa

Heartwater is caused by the organism Ehrlichia ruminantium which is transmitted by ticks of the Amblyomma species. It affects mainly domestic and wild ruminants and it is controlled by use of a live blood vaccine. Alternative vaccines are required due to the limitations associated with the current vaccine. At ARC-OVI research towards alternative vaccines has been ongoing and one example is the use of DNA vaccines.

Previous studies have shown that the DNA vaccines could offer protection in the laboratory but failed in the field where the disease is transmitted by ticks. In this project, we investigated the use of a multi-epitope DNA vaccine which is made up of short sequences from different antigens that were shown to be immunogenic.

After three inoculations with the multi-epitope DNA vaccine delivered by i.m. injection and the gene gun, none of the sheep survived challenge with E. ruminantium infected ticks. However, when the same multi-epitope DNA vaccine was formulated with an adjuvant, it protected three of the five sheep against tick transmitted E. ruminantium infection. From this project, we learnt that when using subunit vaccines like DNA vaccines, it is very important to include appropriate adjuvants in the vaccine formulation in order to improve the immunogenicity of the DNA vaccine.

The primary objective of the study was to analyse the nature of price transmission in the Bloemfontein beef value chain. The deregulation of the South African agricultural market in 1996 led to an unknown difference between the producer and retail prices of beef, which raised concerns among producers. These concerns were caused by the possibility of asymmetry in the market, as the variation in the producer carcass (A2/A3) price and retail price does not always reflect the same relationship. Producers believed that they were carrying all the risk and that retailers fixed their prices, irrespective of the market price at that stage.

The first sub-objective of this study was to determine the existence of a long-term relationship between producer and retail prices. Secondly, the short-term nature of price transmission in the value chain was investigated to determine whether the marketing margin returned to the long-term equilibrium after short term shocks, and how this had taken place. Thirdly, the causality of the market was investigated to determine whether the casual flow of information was bidirectional, unidirectional or undirectional.

The data preparation and the procedures applied to perform the analyses of this study, were the stationary test at levels and at first difference to eliminate any uneven data points or spikes that may skew results. To determine co-integration, four competing models (EG, M-TAR, TAR and MC-TAR) were applied to the three-year data. The model best suited to represent the level of price transmission for each specific data series, would be the one with the highest absolute Akaike information criterion (AIC) value. After confirmation of co-integration and type of transmission (symmetrical or asymmetrical), an error correction model (ECM) was matched with those data series that confirmed asymmetrical price transmission. The error correction model examined the responsiveness of one price to changes in another price at a different level in the chain, thus reflecting the correction ability by speed and magnitude. Lastly, Granger causality was used to analyse the direction of influence between the producer price and retail price.

The results firstly confirmed the existence of a long-term relationship between the producer and retail prices at all four retail outlets (S1, S2, S3 and B) of the Bloemfontein beef market. The actual relationship of all four cases revealed an asymmetrical relationship, of which S1 and B were found to be positive asymmetric, while S2 and S3 were negative asymmetric, indicating that the market margin for S1 and B would thus increase (stretch) while the market margin for S2 and S3 would decline (shrink) in the long term.

Secondly, the short-term nature of price transmission among the various retailers also showed significant differences. S1 and B both reacted quicker and more circumspect to an increase in the producer price than to a decrease. S2 and S3, on the other hand, reacted quicker and more circumspect to a decrease in the producer price than to an increase. The response of S3 in the case of a price increase was found to be insignificant.

Thirdly, results on the flow of market information indicated, at significant levels, that a flow of market information did exist in the markets of three of the four retailers. S1 exhibited significant bidirectional behaviour; S2 revealed undirectional flow of information and a unidirectional influence was identified in the case of S3 and the butchery (B) where information flowed only from the producer to retailer.

Despite the differences within different segments of the price transmission analyses, the transmission for each retailer, with regard to speed and magnitude remained asymmetrical. Asymmetrical price transmission is the change of the price relationship between the producer and retail prices over time. In the case of Bloemfontein, the price transmission relationship of two of the retailers were beneficial for consumers, as the marketing margin declined over time, while the relationship of the other two retailers were detrimental to consumers. The asymmetrical price transmission in the Bloemfontein market could thus not be viewed as a negative factor only. It should, however, be borne in mind that for a market to exist

sustainably in the long term, symmetrical price transmission should be the norm – as retailers with positive price transmission will price themselves out of the market, while the margin of those with negative price transmission will become so small, that they will be forced to close down.