

**Structuring of breeding objectives in the pork supply chain
in South Africa**

by

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DEDICATION

This is dedicated to my son, Daniël Pieter Visser.

IN MEMORIUM

- Oupa DP Visser (18 August 1893 – 29 July 1977)
- Jan van Zyl (15 August 1958 – 22 February 1999)
- Ilse Taljaard (13 May 1947 – 16 February 2003)



DECLARATION

I, Daniël Pieter Visser, declare that this dissertation/thesis which I have compiled and submitted to the University of Pretoria for the PhD degree, represents my own work and has never been submitted to any other tertiary institution for any degree.

DP VISSER

DATE

VERKLARING

Hiermee verklaar ek, Daniël Pieter Visser, dat hierdie werkstuk/thesis wat deur myself saamgestel en voorgelê is aan die Universiteit van Pretoria vir die graad PhD, nog nie van tevore by enige tersiêre inrigting voorgelê is ter verkryging van 'n akademiese kwalifikasie nie.

DP VISSER

DATUM

Structuring of breeding objectives in the pork supply chain in South Africa

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ABSTRACT

Pig production is a techno-scientific internationalized business that is continuously exposed to change and risk. Changes in the Agri-Business are *inter alia* caused by changes in globalization, information technology, biotechnology and changes in consumer trends.

The consumer, within the framework of the pig supply chain, is fundamental to this study. Hence an in depth review of meat market surveys for the period 1970 – 2000 was undertaken. The central theme of the study is: "How to reconcile meat quality, genetics and the consumer with bio-economic pig production in the South African pig supply chain?" A detailed analysis of the South African pig supply chain was subsequently conducted in order to add value further down the supply chain. The inherent structure of the South African pig industry was researched with the emphasis on production statistics, the pig feed industry, genetic improvement and pig information systems, slaughter houses and also slaughtering statistics. The different industry institutions, industry organisations and computer programmes in support of the South African pork supply chain were also investigated.

Genetics is the hidden golden thread running through any livestock supply chain. If a substantial portion of consumer satisfaction and quality assurance can be resolved (guaranteed) at the genetic

level (thus conception), these guarantees will be conducive to quality assurance further down the supply chain. Carcass and meat quality have become increasingly important in modern day pig production, despite the fact that the emphasis has been too long on input efficiency and too short on output efficiency in South Africa.

This called unambiguously for the accurate estimation of genetic parameters of production and carcass traits through appropriate methodology and the right genetic technology. A high degree of accuracy will further optimize the estimation of breeding values, that of breeding objectives and also enhance the credibility of a national breeding scheme. Genetic parameters for five carcass traits were successfully estimated for the first time in the history of South African pig breeding. In future, breeding values for carcass traits, can now be determined more accurately for the Large White, Landrace and Duroc pig breeds. Extension of the present carcass evaluation analysis (Phase E of the National Pig Performance Testing Scheme) to incorporate the essential meat quality traits such as pH_u, marbling, tenderness and colour into future breeding goals should eventually satisfy the consumer.

In order to finally progress from an immature to a mature pig supply chain, pig producers must align themselves with value partners on both the input (raw materials) and output (end product and value added products) end of the supply chain. To embrace the concept of quality (a consumer demand principle) all levels in the production chain (at the genetic level through the breeding objectives, at the farm level through the entire production system, in transit and at the slaughterhouse and processing levels) should be integrated.

Strukturering van teeldoelwitte in die varkvoorsieningsketting in Suid-Afrika

deur

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SAMEVATTING

Moderne varkproduksie is tegnologies wetenskaplik van aard, geïnternasionaliseerd en word voortdurend blootgestel aan veranderinge en risiko. Verandering in die Agri-Besigheid word veroorsaak, onder andere, deur veranderinge in globalisering, inligtingstechnologie, biotegnologie en verbruikerstendense.

Die verbruiker, binne die kader van die varkvoorsieningsketting, is fundamenteel tot die studie. 'n In diepte oorsig rakende vleis markstudies vanaf 1970 - 2000 is uitgevoer in die verband. Die sentrale tema van die studie is: "Hoe word vleiskwaliteit, genetika en die verbruiker in ooreenstemming gebring teen die agtergrond van bio-ekonomiese varkproduksie binne die varkvoorsieningsketting in Suid Afrika?" 'n Omvattende analise rakende die Suid-Afrikaanse varkvoorsieningsketting is gevolglik uitgevoer. Die inherente wese van die Suid-Afrikaanse varkindustrie is nagevors met die klem op produksie statistieke, die varkvoerindustrie, genetiese verbetering en varkinligtingstelsels, abbatoirs en statistieke oor slagtings. Die verskillende instellings en organisasies binne die varkindustrie, asook rekenaarprogramme wat as onderbou vir die varkvoorsieningsketting dien, is ondersoek.

Genetika is die onsigbare goue draad wat deur enige voorsieningsketting in die veebedryf loop. Indien 'n beduidende komponent van die verbruiker se behoefte en ook kwaliteitsversekering op die genetiese vlak (tydens konsepsie) aangespreek (gewaarborg) kan word, sal hierdie waarborge bevorderlik wees tot kwaliteitsversekering in die ander skakels in die voorsieningsketting. Karkas- en vleiskwaliteit word toenemend belangrik in moderne varkproduksie. Insgelyks was die klem te lank op insetdoeltreffendheid met betrekking tot varkproduksie in Suid-Afrika.

Hierdie aksie het onteenseglik gelei tot 'n behoefte aan akkurate berekening van genetiese parameters van produksie- en karkaseienskappe deur middel van toepaslike metodologie en die regte (genetiese) tegnologie. Hierdie hoë vlak van akkuraatheid sal verder die berekening van teelwaardes, die opstel van teeltdoelwitte en die geloofwaardigheid van 'n nasionale teelskema verseker. Vir die eerste keer in die geskiedenis van varkteling in Suid-Afrika, is genetiese parameters vir vyf karkas eienskappe suksesvol bereken. Teelwaardes vir karkas eienskappe kan voortaan meer akkuraat vir die Groot Wit, Landras en Duroc varkrasse bepaal word. Ten einde die eindverbruiker te bevredig, moet die huidige karkas evaluasie (Fase E van die Nasionale Varkprestasietoetskema) uitgebrei word om die noodsaaklikste vleiskwaliteitseienskappe soos pH_u , marmering, sagtheid en kleur in toekomstige teeltdoelwitte te inkorporeer.

Om uiteindelijke vooruitgang te bewerkstellig van 'n onvolwasse na 'n volwasse varkvoorsieningsketting, moet varkprodusente hulself assosieer met voortreflike vennote aan beide die inset- (rou materiale) sowel as die uitsetkant (eindprodukte en waarde toegevoegde produkte) van die voorsieningsketting. Ten einde holisties gesproke die konsep van kwaliteit ('n wesenlike verbruikersbehoefte) aan te spreek, moet alle vlakke in die voorsieningsketting (op genetiese vlak deur middel van die regte teeltdoelwitte, op produsente vlak deur middel van die totale produksiestelsel, tydens vervoer en laastens die abattoirs en verwerkingsaanlegte) geïntegreerd wees.

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ANNEXURE XIII	Compilation of the genetic groups based on year of birth and country of origin