

INVENTORY OF DAIRY R & D IN SA IN THE PERIOD 2015 – 2017

Banga, Cuthbert and others - ARC-Irene.

Projects:

- Genetic parameter estimates for milkability traits in South African Holstein cattle - Agricultural Research Council-Animal Production Institute, in collaboration with the University of Venda.
- Genetic parameter estimates among milk production traits for the first three lactations in South African Guernsey cattle - Agricultural Research Council-Animal Production Institute, in collaboration with the Tshwane University of Technology.
- Heterogeneity of variance for milk production traits between high and low input dairy production systems in South Africa - Agricultural Research Council-Animal Production Institute, in collaboration with the University of Limpopo.
- Evaluation of alternative simulation models for smallholder dairy cattle production systems in South Africa - Agricultural Research Council-Animal Production Institute, in collaboration with the University of Pretoria.
- Genetic analysis of stillbirth in South African Holstein cattle- Agricultural Research Council-Animal Production Institute, in collaboration with the University of Limpopo.
- Evaluation of cow and herd performance for the smallholder and emerging dairy production systems in South Africa - Agricultural Research Council-Animal Production Institute, in collaboration with the University of Limpopo.
- An analysis of the population structure of smallholder dairy cattle herds in South Africa using SNP markers - Agricultural Research Council-Animal Production Institute, in collaboration with the University of Limpopo.
- Sustainability of emerging dairy farmers: A case study of emerging dairy farmers in the North-Eastern Free State Province of South Africa - Agricultural Research Council-Animal Production Institute, in collaboration with the University of Free State.
- Association between animal husbandry practices and the hygienic quality of raw milk: the case of smallholder dairy farmers in the Eastern Cape Province of South Africa - Agricultural Research Council-Animal Production Institute, in collaboration with the University of Fort Hare.

- Development and implementation of a ruminant-cheese model for rural areas of South Africa - Agricultural Research Council-Animal Production Institute, in collaboration with the Stellenbosch University.
- Application of SNP markers for parentage identification on smallholder dairy herds in South Africa- Agricultural Research Council-Animal Production Institute, in collaboration with the University of Limpopo.
- Development of a breeding programme for the low input dairy production system in South Africa - Agricultural Research Council-Animal Production Institute, in collaboration with the University of Fort Hare.
- Application of genomic technologies to enable accelerated genetic improvement in smallholder dairy herds - Agricultural Research Council-Animal Production Institute, in collaboration with the University of KwaZulu-Natal.
- Evaluation of the microbial aspect of rural small-scale farmers' raw milk handling practices from production to utilization - Agricultural Research Council-Animal Production Institute, in collaboration with the University of KwaZulu-Natal.
- Genetic evaluation of functional traits in South African dairy cattle - Agricultural Research Council-Animal Production Institute, in collaboration with the University of Pretoria.
- Random regression models for the estimation of breeding values of dairy production traits cattle - Agricultural Research Council-Animal Production Institute, in collaboration with the University of Venda.
- Ingrid Tsoeu:
- Microbial & physiochemical evaluation of artisan cheese produced in a rural environment of South Africa - Agricultural Research Council-Animal Production Institute, in collaboration with Stellenbosch University.

Scientific Publications:

- Imbayarwo-Chikosi, V.E., Ducrocq, V., Banga, C.B., Halimani, T.E., Van Wyk, J.B., Maiwashe, A. & Dzama, K. 2016. Impact of conformation traits on functional longevity in South African Holstein cattle. *Animal Production Science*. <http://dx.doi.org/10.1071/AN16387>.
- Imbayarwo-Chikosi, V.E., Ducrocq, V., Banga, C.B., Halimani, T.E., van Wyk, J.B., Maiwashe, A. & Dzama, K. Estimation of genetic parameters for functional longevity in the South African Holstein cattle using a piecewise Weibull proportional hazards model. *Journal of Animal Breed Genetics* :1–9

- Tanyanyiwa, F. K., Kolanisi, U., Chimonyo, M. & Banga, C.B. Identification of entrepreneurial characteristics of emerging smallholder dairy farmers: A case study of Groblersdal and Matatiele local municipalities, South Africa. *Journal of Human Ecology*: 57 (3).

Conference Presentations:

- CB Banga, An optimal approach to minimising prediction error variance in selection objectives, 49th SASAS Congress, Spier Hotel and Conference Centre, Stellenbosch, South Africa, 3-6 July 2016.
- O Abejide, M Chagunda, R Mrode, G Banos, J Ojango, C Banga, G Simm. Joint genetic analysis of Jersey dairy cows performing in two countries in Sub Saharan Africa. Proceedings of the British Society of Animal Science Annual Conference, Animal Science for a Sustainable Future, held in Chester, UK, 6-7 April 2016.
- Muntswu, A.E. Breeding and management practices on small holder and emerging dairy herds in South Africa. 49th SASAS Congress, Spier Hotel and Conference Centre, Stellenbosch, South Africa, 3-6 July 2016.
- Z Gobane, CB Banga & V Muchenje. Application of genomics technology for smallholder dairy cattle breeding in South Africa: challenges and opportunities. SA Large Herds Conference, Champagne Sports Resort, Drakensberg, KwaZulu-Natal, 5-7 June 2017.
- Banga, CB. 2016. Development of genetic improvement programmes for smallholder dairy herds in Southern Africa through the application of genomic technologies. International Atomic Energy Agency Research Coordination Conference, Vienna International Centre, Vienna, Austria, 3-7 October 2016

Dugmore, Trevor and others – KZN Dept. of Agriculture and Rural Development.

Projects:

- Accelerated calf rearing: To determine the effect of accelerated calf rearing on dairy calf and heifer growth, as well as first lactation milk production.
- Evaluation of bio-active forages for livestock health and production
- Mitigation of climate change on livestock production
- Evaluation of the effect of round-up, soil temperature and soil moisture on the establishment of ryegrass oversown into kikuyu

- Evaluation of *Festuca arundinacea* (Tall Fescue) varieties, relative to other temperate species for herbage quality and grazing management to determine suitability as a lower input pasture for dairy systems.
- Evaluation of medium and long duration forage cereal varieties to be grown in a mixture with forage legumes
- Elite pasture cultivar evaluation trials
- Manure as alternative fertilizer for pastures
- The genetic improvement and development of suitable germplasm for future pasture production in KZN
- Evaluation of kikuyu cultivars for chemical composition, yield and adaptability to cold environments
- The effect of soil temperature on rye grass growth rate

Publications:

- Trevor Dugmore. Kikuyu in South Africa: A review. Submitted to SASAS Journal in August 2017.
- Nicky Findlay, 2016. Ryegrass for dairy: get your soils right. Research & Technology Bulletin 2016/05
- Nicky Findlay, 2016. Perennial ryegrass for dairy cows grazing from the third-leaf stage. Research & Technology Bulletin 2016/06

Fosgate, Geoff and others – Faculty of Veterinary Science, UP.

Scientific publications:

- Fosgate GT, Motimele B, Ganswindt A, Iron PV. A Bayesian latent class model to estimate the accuracy of pregnancy diagnosis by transrectal ultrasonography and laboratory detection of pregnancy-associated glycoproteins in dairy cows. Prev Vet Med 2017;145:100-109.
- Mulder R, Fosgate GT, Tshuma T, Lourens DC. The effect of cow-level factors on colostrum quality, passive immunity and health of neonatal calves in a pasture-based dairy operation. An Prod Sci (in press).
- Cenci-Goga B, Karama M, Sechi P, Iulietto M, Novelli S, Selvaggini R, Mattei S (2015). Growth inhibition of selected microorganisms by an association of dairy starter cultures and probiotics . Italian Journal of Animal Science, 14 pp. 246 - 256.

- Nyanzi R, Shuping DSS, Jooste P, Eloff JN (2015). Antibacterial and Antioxidant Activity of Extracts from Selected Probiotic Bacteria . Journal of Food Research, 4 (NOT ACCREDITED), pp. 122 - 125.
- Nyanzi R, Jooste P, Eloff JN (2016). Multi-Loci Gene Sequencing and Identification of Bifidobacteria Strains Isolated from Dairy and Pharmaceutical Sources in South Africa. FOOD BIOTECHNOLOGY, 30 (1), pp. 30 - 48.
- Sserunkuma P, McGaw LJ, Nsahlai I, van Staden J (2017). Selected southern African medicinal plants with low cytotoxicity and good activity against bovine mastitis pathogens. SOUTH AFRICAN JOURNAL OF BOTANY, 111 pp. 242 - 247.

Capacities:

- Epidemiological and bio-statistical capacity to help with different research projects.

Hugo, Arno and Celia – Dept. of Microbial, Biochemical and Food Biotechnology, UFS.

Projects:

- The significance of proteolytic psychrotrophs as a cause of milk flocculation / protein instability
- The significance of psychrotrophic chryseobacteria in milk

Scientific publications:

- Bekker, A., Steyn, L., Charimba, G., Jooste, P. and Hugo, C. 2015. Comparison of the growth kinetics and proteolytic activities of Chryseobacterium species and Pseudomonas fluorescens. Canadian Journal of Microbiology 61(12): 977-982.
- Bekker, A., Jooste, P., Steyn, L., Bothma, C., Hugo, A. and Hugo, C. 2016. Lipid breakdown and sensory analysis of milk inoculated with Chryseobacterium joostei or Pseudomonas fluorescens. International Dairy Journal 52: 101-106.
- Tsôeu, I., Jooste, P.J., Charimba, G. and Hugo C.J. 2016. Spoilage potential of a novel group of bacteria isolated from dairy products. South African Journal of Science 112(1/2): 140-147.
- Faihs, T.-J., Myburgh, J., Bothma, C., Hugo, C. and Hugo, A. 2017. The effect of conjugated linoleic acid supplementation on the microbial, physical, chemical and sensory properties of yogurt. International Journal of Dairy Technology 70(2): 228-236.

Laing, Mark – Discipline of Plant Pathology, UKZN

Programme: Investigating alternative methods such as bacteriophages and bacteriocins to eliminate/control mastitis organisms

Projects:

- The biological control of *Staphylococcus aureus*-induced bovine mastitis using bacteriophage therapy; Student: Mxolisi Ndlela
- The development of improved protocols for the accurate and rapid detection of mastitis in milk; Student: Mduduzi Shinga.
- The application of phage for the biological control of streptococcus-induced bovine mastitis; Student: Caleb Pillay.
- The extraction and assessment of bacteriocins and *Bacillus* spp. Lipopeptides for the management of mastitic microorganisms; Postdoctoral Researcher: Iona Basdew.
- The application of near-infrared analysis as an alternative tool for mastitis detection in raw milk; Postdoctoral Researcher: Iona Basdew.

Programme: Integrated Control of Liver Flukes of Cattle Using Botanical Extracts and Biocontrol Agents; Postdoctoral Researcher: Mawahib Ahmed.

Scientific publications:

- I.H. Basdew, M.D. Laing. (2015). Investigation of the lytic ability of South African bacteriophages specific for *Staphylococcus aureus*, associated with bovine mastitis. *Biocontrol Science and Technology*, 25:4, 429-443, DOI: 10.1080/09583157.2014.983458
- N.W. Sithole, I.V. Nsahlai, M. Chimonyo. (2015). Water and Wastewater Management in the Dairy Industry. *Natsurv 4 WRC*, Pretoria.

Conference Proceedings:

- I.H. Basdew, M.D. Laing. (2016). Investigations into the lytic ability of South African bacteriophages specific for *Staphylococcus aureus*, associated with bovine mastitis. *Proceedings of the 6th IDF International Mastitis Conference*, Nantes, France.
- M. Ndlela, M.D. Laing. (2016). Investigations into the lytic ability of South African bacteriophages specific for *Staphylococcus aureus*, associated with bovine mastitis. *Proceedings of the 6th IDF International Mastitis Conference*, Nantes, France.

Capacity and Research Equipment:

- Near-infrared analysis unit + data package to operate software and carry out analysis
- Transmission electron microscope
- Scanning electron microscope
- Incubators and shakers
- Centrifuges
- Flow cytometer
- Biosafety cabinet (Level 4)
- GC-MS unit

Mostert, Bernice - SA Stud Book

Technical Reports:

- MOSTERT, B.E., 2015. Influence of Percentage Swedish Red Crossbreeding on Performance of Dairy Cows. For: Milk SA.
- MOSTERT, B.E. & VAN DER WESTHUIZEN, R.R., 2016. Logix Milk Annual Report 2015/16. For: SA Stud Book.

Conference Proceedings:

- MOSTERT, B.E., VAN DER WESTHUIZEN, R.R., VAN MARLE-KOSTER, E. & VAN DOORMAAL, B.J., 2015. Exploring methodology for application of genomic information in South African dairy breeds. Joint Annual Meeting of the American Dairy Science Association, 12 – 16 July 2015, Orlando, Florida (Poster).
- VAN DER WESTHUIZEN, J., GREYLING, S., FRANCIS, S., MOSTERT, B.E. & VAN DER WESTHUIZEN, R.R., 2016. Practical use of Milk Recording Information. 10th ICAR Biennial Session, Puerto Varas, Chile.
- VAN DER WESTHUIZEN, MOSTERT, B.E., VAN DER WESTHUIZEN, R.R.,
- VAN MARLE-KÖSTER, E. & JOUBERT, R., 2017. The South African Perspective. InterGenomics Workshop, 8 February 2017, Slovenia.
- MOSTERT, B.E. Adding value through measuring. Dairy Goat Information Day organized by the Northern Cape Department of Agriculture and SA Milch Goat Society. 26 May 2016, Rietrivier Experimental Farm, Northern Cape.

MSc Thesis: BRAND, W., 2015. The development of standard lactation curves for the South African Jersey population. MSc (Agric), Department of Animal and Wildlife Sciences, University of Pretoria.

Capacities and expertise:

Research and Genetic Evaluation Unit: 3 PhD, 1 MSc and 2 BSc (Agric) employees in Animal Breeding and Genetics. This unit is currently responsible for genetic evaluations of beef, dairy, sheep and pig breeds, as well as population studies for horse and dog breeds as well.

SA Stud Book has an operational Database (Logix) designed specifically for capturing, storing and processing of dairy data, integrated with pedigree and genomic information. SA Stud Book also has the capacity for storage of pedigree and genomic (SNP) data for an unlimited number of animals.

Dr BE Mostert has represented South Africa at the following Interbull Meetings :

- INTERBULL Meeting, 2015. July 9 – 12. Orlando, USA.
- INTERBULL Meeting, 2016. October 24-28. Puerto Varas, Chile.

Dr Japie van der Westhuizen is a board member of ICAR.

Mupangwa, John – Dept of Livestock and Pasture Science, UFH.

Information captured in B. CONGRESS PROCEEDINGS

Myburgh, Koos – Dept. of Microbial, Biochemical and Food Biotechnology, UFS.

Projects:

- The production and application of bio-active components present in milk to accelerate yoghurt fermentation time, 2017
- The production of lactose free milk using lactase for infants, 2016
- Milk Flocculation, 2017
- The impact of plasmin during flocculation and age gelation
- The impact of protease produced by psychrotrophic bacteria on flocculation and age gelation.
- The impact of homogenization on proteolytic enzymes
- The impact of fat and free fatty acids content on proteolytic activity
- The impact of various components present in milk on the activation or inhibition of Plasminogen conversion to active plasmin

Scientific Publications

- Faiht T-J, Myburgh J, Bothma C, Hugo C and Hugo A. 2017. The effect of conjugated linoleic acid supplementation on the microbial, physical, chemical and sensory properties of yogurt. International Journal of Dairy Technology - Manuscript ID IJDT-0083-15.R1

Conference Presentations:

- Myburgh, J and Hattingh A. 13-16 April 2015. 48th SASDT Annual Meeting and Symposium. Cape St Francis Resort, Southern Cape. "The effect of heat exposure on *B-Lactoglobulin* in raw milk"
- Smith A and Myburgh J. 13-16 April 2015. 48th SASDT Annual Meeting and Symposium. Cape St Francis Resort, Southern Cape. "rbST in Milk" Hybrid code 11, CESM code 01
- Calitz A and Myburgh J. 8-11 May 2017. 50th SASDT Annual Meeting and Symposium. Kivits Kroon, Pretoria. "The acceleration of yogurt fermentation by means of peptides derived from proteolytic pre-treatment of milk"
- Hatting A and Myburgh J. 8-11 May 2017. 50th SASDT Annual Meeting and Symposium. Kivits Kroon, Pretoria. "Computer assisted identification of proteolytic peptide profiles using MILQC software"
- Dube S and Myburgh J. 8-11 May 2017. 50th SASDT Annual Meeting and Symposium. Kivits Kroon, Pretoria. "The susceptibility of milk proteins towards *Bacillus* protease after gas pre-treatment"
- Dube S and Myburgh J. 29 October to 3 November 2017. World Dairy Summit (WDS 2017) in Belfast. Ireland (UK). "The Susceptibility of Milk Proteins towards *Bacillus* Protease after Gas Pre-treatment"

Techniques developed or modified for the Dairy Industry:

- Detection of proteolysis within milk using RP-HPLC
- Detection of proteolysis in milk using modified milk agar plates
- Possible retarding of proteolytic activity
- Monitoring the activation of plasminogen
- Develop MILQC software to enable comparison between HPLC peptides to help us to distinguish between plasmin and bacteria protease proteolytic activity.
- The acceleration of yogurt production
- The production of bioactive components within milk using protease

- O₂ measurement in milk as a function of time
- Redox-potential measurement in milk as a function of time
- The cultivation of psychrotrophic bacteria known to cause flocculation and age gelation in milk
- The harvesting of their proteolytic enzymes for future experiments
- To study their proteolytic enzymes impact on milk proteins (Casein)
- The development of a method to store proteolytic and other enzymes for extended periods of time

Rust, Jean and others – Eastern Cape Dept. of Rural Development and Agrarian Reform

Projects:

The development of a simplified once a day milking protocol for the Eastern Cape dairy industry

- Determining the potential of the Dexter cow as subsistence milk producer in the developing agricultural sector
- Evaluation of the performance and management of Holstein calves on once a day (OAD) and twice a day (TAD) feeding from birth to weaning
- Characterization of the production and consumption of milk in the communal livestock production sector of the Eastern Cape

Scientific papers:

- Goni, S., Muller, C.J.C., Dube, B. & Dzama, K., 2016. Effect of crossbreeding on beef production of Jersey herd using Fleckvieh sires maintained on a pasture based feeding system. *Open Journal of Animal Sciences*, 6, 163-168.
- Rust, J.M., & Mkhungela, M.N., 2016. The effect of milk feeding frequency on the performance of Dexter x Holstein calves from birth to weaning. *Applied Animal Husbandry & Rural Development*, (9), 1-5

Congress Proceedings and others:

- Goni, S., Muller, C.J.C., Botha, J.A., Dube, B. & Ndzama, K. Crossbreeding effect on milk production of Jersey cows using dual-purpose Fleckvieh sires. Poster presentation delivered at 49th SASAS Congress held at Stellenbosch from 4-6 July 2016.

- Mkhungela, M.N. & Rust, J.M., 2016. Evaluation of communal cattle milk production in the Eastern Cape Province. Poster presentation delivered at the 34th Congress of the South African Society for Agricultural Technologists (SASAT) held in Upington, 6-9 September 2016.
- Kumbirai, K.T., Mupangwa, J.F., Muchenje, V. & Rust, J.M. 2016. Characterisation of the production and consumption of milk in the communal livestock production sector of the Eastern Cape Province, South Africa. (Msc Agric Dissertation - University of Fort Hare)

Schmidt, Tracy – Allerton PVL

Scientific publications:

- T. Schmidt, M. M. Kock and M. M. Ehlers, 2015. Diversity and antimicrobial susceptibility profiling of staphylococci isolated from bovine mastitis cases and close human contacts. *J. Dairy Sci.* 98, 6256-6269.
- T. Schmidt, M. M. Kock and M. M. Ehlers, 2015. Antimicrobial resistance in staphylococci at the human-animal interface *In* Antimicrobial Resistance – An Open Challenge. Edited by M. C. Ossiprandi. <http://dx.doi.org/10.5772/61785>
- T. Schmidt, M. M. Kock and M. M. Ehlers, 2017. Molecular characterization of *Staphylococcus aureus* isolated from bovine mastitis and close human contacts in South African Dairy Herds: genetic diversity and inter-species host transmission. *Front. Microbiol.* 8:511 doi: 10.3389/fmicb.2017.00511

Conference presentations:

- Tracy Schmidt, Marleen M Kock, Marthie M Ehlers. Occurrence and distribution of superantigen toxin genes in Staphylococci recovered from bovine intramammary infections and close human contacts. **Oral presentation** at the South African Society for Microbiology 2016 biennial congress, Umhlanga, KwaZulu-Natal, South Africa, 17-20 January 2016.
- Tracy Schmidt, Marleen M Kock, Marthie M Ehlers. Genetic characterization and profiling of *Staphylococcus aureus* strains isolated from bovine intramammary infections and close human contacts. **Poster presentation** at the 26th European Congress of Clinical Microbiology and Infectious Diseases, Amsterdam, The Netherlands, 09-12 April 2016.
- Tracy Schmidt, Marleen M Kock, Marthie M Ehlers. Molecular characterisation of *Staphylococcus aureus* isolated from cases of bovine mastitis and close human contacts in KwaZulu-Natal, South Africa. **Oral presentation** at the 6th International Dairy Federation Mastitis Conference, Nantes, France, 07-09 September 2016