



Co-ordination, support and promotion of needs-driven research & development in the South African dairy industry

(PRJ-0094-2016)

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Year 2016 (January 2016 till December 2016)

Project goals

Goal 1 - To limit research fragmentation and promote and initiate cooperation between R&D capacities towards achieving the strategic direction of the industry

Achievements

A. THE LIVER FLUKE PROGRAMME: The programme consists of two projects: (1) *Fasciola hepatica*: Impact on Dairy Production and Sustainable Management on Selected farms in South Africa, with Dr Jan van Wyk of OP as Project Leader, and (2) Integrated Control of Liver Flukes of Cattle using Botanical Extracts and Bio-control Agents, with Prof Mark Laing of UKZN as Project Leader and post-doctoral student Dr Mawahib Ahmed as the responsible researcher. It appeared logical to promote cooperation since the sampling and surveillance activities of (1) are important for (2) as well. In addition, the outcomes of (1) will provide seasonal information, distribution and sensitivity criteria of the *Linnaeus* intermediate host (snail) of *Fasciola*, which would be of value in strategizing the approach to finding and implementing bio-agents which would kill or control *Linnaeus*. The co-operation should streamline operating procedures, timelines and costs.

B. THE MASTITIS PROGRAMME: This programme also consists of two projects: (1) Resistance to available antibiotics in lactating cows with mastitis, with Project Leader Dr Martin van der Leek of OP, and (2) Investigating alternative methods such as bacteriophages and bacteriocins to control mastitis organisms, also with Prof Mark Laing of UKZN as Project Leader and Postdoctoral student Dr Iona Basdew as the responsible researcher. Identification and characterisation of the important mastitis organisms as affected by season, locality and possible resistance to antibiotics in the market are priority activities of both projects and therefore co-operation in sending important organisms to both laboratories are critical. A MoA between UP and UKZN to that effect was facilitated, especially also as to the format it will affect the mastitis laboratory of Dr Inge-Marie Petzer at Onderstepoort. One of the conditions is that they will publish collectively on co-operation outcomes. The arrangement appears to function well. Further co-operation in the UP project will be with the University at Utrecht, which has the capacity to deal with extended databases; a PhD is expected to flow from this initiative. A further addition is that the database of the Mastitis laboratory at OP will be examined to see if the results are suitable to be linked with the Genomics Project, also through a PhD investigation (Ms Robyn Joubert, editor of the Dairy Mail).

C. THE MILK FLOCCULATION PROGRAMME: In this programme co-operation between the researchers responsible for respectively the milk enzymatic component (Dr Koos Myburgh) and the psychrotrophic component (Prof Celia Hugo) was established. This has enhanced the outcomes. A more recent development is that the problem of biofilms may contribute to the prevalence of milk flocculation. Discussions were consequently held with various expertise to understand their take on the possibility of biofilms being a significant factor in the evolution of flocculation. This was followed up with a visit to a prominent processing plant where delivered milk often flocculated. The plant is willing to work with Milk SA and in fact is prepared to make

available all their managerial, environmental and analytical data over the last couple of years. It is expected that this initiative to support the project will add considerable value to the investigation since it will allow statistical analyses over time and distinguish between main and interaction effects.

D. INTEGRATED DAIRY ANIMAL PERFORMANCE IMPROVEMENT PROGRAMME: The Genomics Project is conducted on behalf of the Dairy Industry with UP (Prof Este van Marle-Koster) as the driver in terms of managing the TIA allocated funds. They have contracted other service providers with expertise from tertiary institutions, the ARC and SA Studbook. The MPO supports management of the project by assisting with commitment of the participating breed societies and other members with milk recording data to ensure a viable reference population which is required to facilitate GEBV values. Of significance is that Ms Robyn Joubert will have the opportunity to participate in the project and may obtain a PhD on some of the resulting data. This project is an excellent example of a network of expertise and capacities put together towards achieving the goal. In the Project to analyse automatic system data of farmers, it was negotiated with institutions such as Dairy MC and a feed company to assist with extracting data and logistics. This has enhanced the initiative considerably and a Masters project at UP to that effect has been registered.

E. CO-OPERATION WITH OTHER LIVESTOCK SECTORS: (1) The problem of resistance to antimicrobials and anthelmintics identified in the dairy research programme as being of primary priority is also a major problem in the Red Meat, Wool and Mohair sectors. Thus, it made sense to facilitate co-operation between the sectors in addressing the problem of resistance. In a Meeting with the relevant CEO's the principle of working together (possible joint projects which should positively influence efficacy, sustainability and resources) was established. Associated with this topic is the concern that expertise and capacity at OP in helminthology and parasite resistance is dwindling. The proposal of establishing a Research Chair in Parasite Resistance at the Veterinary Faculty to address both the resistance issue and capacity building was also supported by the CEO's of the other livestock sectors and since followed up with the Dean of the Veterinary Faculty at OP. The Research Chair appears to be the logical way to take the issue forward. However, since the establishment of a Research Chair will take some time a motivation for a post in Helminthology was prepared as an interim arrangement. (2) The Project: National Disease Monitoring and Extension System of Dr Danie Odendaal of V-Net overlapped with a similar activity which he ran with the Red Meat Sector, and the Wool sector also regards this as priority. At the Meeting with the other livestock CEO's it was accordingly proposed that ways should be explored towards a joint initiative which could probably entail working through RuVASA as the driving vehicle. Since then, Milk SA decided to end the project as the development phase was completed and it can enter the implementation phase in conjunction with the MPO. (3) Brucellosis is a major concern of all ruminant livestock sectors. In the five year research plan of Milk SA inroads into the problem of brucellosis was supported by the Board. Discussions were initiated in 2015 with the CSIR where research is done to develop a rapid on-site diagnostic tool to diagnose brucellosis and other diseases. The CEO's of the other sectors supported the initiative. In the mean time the Animal Health Forum decided to take this initiative forward. To that effect a driving committee has been formed to strategize and propose implementation actions. It was proposed to link up with this initiative and therefore the Milk SA project with the CSIR on point-of-care diagnosis is one of the actions that should be taken on board by the Committee. (4) The Western Cape Department of Agriculture (WCDA) did a survey to establish R & D needs of dairy farmers in the province. Dr van Dijk and the author have been requested to evaluate the outcome and provide input. The survey which was outsourced should be valuable in providing directives for future R & D.

No Non-achievements / underperformance has been reported

Goal 2 - To guide the R&D programme by means of effective structural arrangements, administration and fund sourcing

Achievements

Non-achievements / underperformance

A. MEETINGS: The RPEC met on 18 February, 17 May and 19 July 2016, the latter being the last Meeting of the disbanded RPEC. One of the outcomes resulting from the RPEC Meetings was to explore the implications of the change in research funding policy and procedures of DTI funds which until 2015 was managed by the NRF in the so-called THRIP application. This fund as from 2016 is administered by the DTI itself and whereas the applicant in the past was the tertiary institution or other service provider, the applicant according to the new policy is the industry/sector itself. This appears to provide the security to the DTI that the relevant sector does indeed want the particular research applied for to be done as the sector is prepared to guarantee a particular amount to fund the project. A requirement in the policy is that the applying sector should establish a company without profit to administer the project and funds. Since Milk SA is such a company which deals with R & D, it offered the opportunity to apply for funding in the THRIP call. It was decided to put the Liver Fluke and Mastitis programme together under a general theme of antimicrobial/anthelmintic resistance which would fit in with the objectives of the Research Chair at OP discussed under Goal 1. The resulting project title was: Integrated management of drug-resistant parasites and pathogens affecting dairy cattle, and the associated budget R13.5 million over three years. An important resolution taken at the February RPEC Meeting was to withhold funds to a particular project until the quarterly report is submitted. This was necessary since some project leaders do not submit by the deadline date. Another resolutions worth mentioning are: That provincial departments of agriculture be strongly encouraged to interact with producers; and that the MPO be requested to actively inform producers during their regional meetings, over and above the written reports, of the work carried out within Milk SA's R & D programme. In association, to convey to the MPO the need to establish unique structures - each with a responsible person - in the different regions as a matter of urgency. These resolutions imply that effective structures and communication between producers and the R & D structures to facilitate and give guidance to their needs are still not effective. One of the discussion items at the RPEC Meetings was the financial status of the R & D programme, which could result in the closing or scaling down of some projects. As mentioned above an application to the THRIP programme of the DTI was submitted. Another discussion item which will affect the future functioning of the R & D Programme, was the resolution that the RPEC should review its name, role, functions and reporting structures. Principles in the resulting new structural arrangement were: (a) the Advisory Committee R & D will fall away; (b) the RPEC will be replaced by a R & D Committee with increased representation to accommodate in addition to the functions of the RPEC, also advisory and recommendation functions; (c) a Management Committee consisting of the R & D Manager, the CEO of the MPO and the CEO of the SAMPRO will screen R & D proposals from industry and elsewhere before submitting to the R & D Committee; (d) the SESCORD will be replaced by a Research Forum consisting of industry and expert members; (e) R & D proposals from the MPO members will be submitted

A request to the THRIP funding model of the DTI for the parasite resistance initiative was submitted, but it was apparently unsuccessful.

Reasons for non-achievements / underperformance

No response was received from the DTI notwithstanding several e-mails. As other applicants had similar experiences, it appears that the DTI's processes are still not functional. In previous years the NRF administered the THRIP call, but DTI decided to take it back in 2016.

Planned remedies for non-achievements / underperformance

The progress of DTI in this context will be monitored in 2017 and if developments appear promising a new application will be submitted.

directly to the Management Committee from provincial structures instead of through the National Producers R & D Committee - the latter which will fall away; the MPO will do the administration of the R & D Programme to relieve the burden on the Milk SA office.

The last SESCORD Meeting was held at the Wilderness on 8 July 2016, to coincide with the Annual Congress of the Grassland Society. As mentioned, SESCORD was disbanded to make way for the DRF that will not only cater for the needs of the pasture systems, but also for the needs of the TMR systems. In retrospect, the SESCORD was successful as it brought together the relevant expertise and farmers, stimulated co-operation between research institutions and primary projects were initiated in the discussions.

The first Meeting of the new dispensation, called the Dairy Research and Development Committee (DRDC), was held on 1 September and the second on 3 November 2016. Terms of References were written for the different functionaries supporting decision making and recommendation in the structure: the Dairy Research Forum (DRF), the Management Committee and the DRDC. To give effect to the Board decision that the MPO will take over the administration, arrangements have been discussed between the MPO CEO and the Programme Manager. The administration will be in full operation as from 1 January 2017.

B. R & D OUTLOOK: An anticipated R & D needs document and budget was compiled by the Programme Manager for the the levy cycle 2018 to 2021. It was updated in December 2016, amongst others to give more prominence to bio-security. The proposal is dynamic and may change considerably during the course of the period. However, it does provide guidance for effective planning, discussions and negotiations.

C. MoA's: The MoA with the KZN Department of Agriculture after several months of delay has been signed. The MoA discussions with the Eastern Cape have been discontinued as there have been no response. The MoA's with the ARC and SA Studbook will not be pursued further as they are now regarded as service providers.

Goal 3 - To accumulate and publish existing domestic and international scientific knowledge of applicable and practical value to enhance the industry

Achievements

A. THE RESEARCH COLUMN: The target of scientific articles sourced from the international literature to be entered on the website is two per month i.e. 24 per year. A total of 28 was put on the website which met the target. Some of these were also published in the Dairy Mail under the regular research column of the author. Topics covered as reflected in the titles of the papers include:

- * Spore populations among bulk tank raw milk and dairy powders are significantly different.
- * Effect of a second treatment with prostaglandin F_{2α} during the Ovsynch protocol on luteolysis

and pregnancy in dairy cows

- * Evaluation of presynchronization with gonadotropin-releasing hormone 6 d before initiation of Ovsynch and addition of a second prostaglandin F_{2α} treatment.
- * Use of cheese whey for biomass production and spray drying of probiotic lactobacilli.
- * The effect of pulsation ratio on teat condition, milk somatic cell count and productivity in dairy cows in automatic milking.
- * Effect of injectable vitamin E on incidence of retained fetal membranes and reproductive performance of dairy cows.
- * Saturated fat supplementation interacts with dietary forage neutral detergent fiber content during the immediate postpartum and carryover periods in Holstein cows: Production responses and digestibility of nutrients.
- * Development of an index to rank dairy females on expected lifetime profit.
- * Effects of group housing of dairy calves on behaviour, cognition, performance and health.
- * Effect of concentrate feeding method on the performance of dairy cows in early to mid lactation.
- * Effect of 2 different pre-milking teat sanitation routines on reduction of bacterial counts on teat skin of cows on commercial dairy farms.
- * The effect of storage temperature and duration on the microbial quality of bulk tank milk.
- * Inclusion of sainfoin (*Onobrychis viciifolia*) silage in dairy cow rations affects nutrient digestibility, nitrogen utilization, energy balance and methane emissions.
- * A comparison of individual cow versus group concentrate allocation strategies on dry matter intake, milk production, tissue changes and fertility of Holstein-Friesian cows offered a grass silage diet.
- * Dairy farms testing positive for *Mycobacterium avium* ssp. *paratuberculosis* have poorer hygiene practices and are less cautious when purchasing cattle than test-negative herds.
- * Role of bacterial endotoxins in the etiopathogenesis of periparturient diseases of transition dairy cows.
- * Effect of maternal heat stress in late gestation on blood hormones and metabolites of newborn calves.
- * Cow- and farm-level risk factors for lameness on dairy farms with automated milking systems.
- * Comparing technical efficiency of farms with an automatic milking system and a conventional milking system, and Estimating efficiency in automatic milking systems.
- * Bacterial counts on teat skin and in new sand, recycled sand, and recycled manure solids used as bedding in freestalls.
- * Effects of Somatic Cell Count on Quality and Shelf-Life of Pasteurized Fluid Milk and Effects of Somatic Cell Count and Milk Composition on Cheese Composition and Cheese Making Efficiency.
- * Draining and salting as responsible key steps in the generation of the acid-forming potential of cheese: Application to a soft blue-veined cheese.
- * In vitro evaluation of a novel bacteriophage cocktail as a preventative for bovine coliform mastitis.
- * Effects of automatic cluster removal and feeding during milking on milking efficiency, milk yield and milk fat quality.
- * Effect of time of maize silage supplementation on herbage intake, milk production, and nitrogen excretion of grazing dairy cows.
- * The influence of dietary nitrogen reduction and conjugated linoleic acid supply to dairy cows on fatty acids in milk and their transfer to ripened cheese.
- * Investigation of the antibiotic resistance and biofilmforming ability of *Staphylococcus aureus* from subclinical bovine mastitis cases.
- * Economic feasibility of cooling dry cows across the United States.
- * Condensed milk storage and evaporation affect the flavor of nonfat dry milk
- * The effect of spray-drying parameters on the flavor of nonfat dry milk and milk protein concentrate 70%.

B. DAIRY R & D IN SA: The target of South African scientific articles sourced to be entered on the website is also two per month, or 24 per year. The target was met with 24 entries. Topics

include:

- * DAIRY PRODUCTION EXPERIMENTS FOR FARMERS IN THE DEVELOPING SECTOR.
- * THE RUMEN ORGANISM MEGASPHAERA ELSDENII CAN ASSIST DEVELOPMENT AND GROWTH OF PREWEANED CALVES.
- * WITHIN UDDER INFECTIONS IN PREGNANT HEIFERS WHICH WERE HOUSED TOGETHER AND REARED ON FRESH MILK AS CALVES.
- * A SYSTEMS APPROACH FOR DAIRYING IN SOUTH AFRICA.
- * HERD STRUCTURE AND LONGEVITY IN HOLSTEIN AND JERSEY HERDS.
- * IMPLICATIONS AND PRACTICALITIES OF GHG MITIGATION.
- * DIRECTIVES AND GUIDELINES TO REDUCE THE CARBON FOOTPRINT.
- * BEHAVIOUR OF HOLSTEINS, JERSEYS AND THEIR CROSSES ON PASTURE AT FORT HARE.
- * MILK FATTY ACID CONCENTRATION AS AFFECTED BY BREED AND STAGE OF LACTATION.
- * GENOMIC TESTS FOR HEAT TOLERANCE.
- * EFFICACY OF BACTERIOPHAGE THERAPY AGAINST MASTITIS-CAUSING STAPH AUREUS.
- * CROSS BREEDING JERSEY AND ANGUS FOR DUAL PURPOSE PRODUCTION IN SMALLHOLDER SYSTEMS.
- * MOLECULAR CHARACTERIZATION OF STAPH AUREUS ASSOCIATED WITH THE COW-HUMAN INTERFACE.
- * Reduction of product loss in dairy foods manufacturing.
- * Bacteriophages as measure to control Staph. aureus mastitis.
- * History of pasture cultivation for dairy production in the southern Cape and alarming signs of soil fertility status.
- * Integrated control of liver fluke in dairy cattle.
- * Impact of liver fluke on dairy production and sustainable management.
- * Importance of dedicated R & D for the dairy sector.
- * KIKUYU - RYEGRASS FOR DAIRYING: IS THERE A RELATIONSHIP BETWEEN SOIL QUALITY AND YIELD?
- * HERBAGE YIELDS OF ANNUAL RYEGRASS VARIETIES AT OUTENIQUA AND CEDARA.
- * LUCERNE LEAF MEAL FOR PRE-WEANED DAIRY CALVES
- * PRELIMINARY RESULTS OF LIVER FLUKE (FASCIOLA) RESEARCH PROJECT
- * CONTROL OF STAPHYLOCOCCUS AUREUS BY BACTERIOPHAGES – A PROGRESS REPORT ON THE RESEARCH PROJECT.
- * GREENHOUSE GAS EMISSIONS AND CARBON STORAGE IN PASTURES.

C. OTHER ARTICLES OF PRACTICAL VALUE: Three contributions were made to the MILK ESSAY, one of which was also published in the MPO MILK BULLETIN:

- * Towards sustainable and eco-friendly dairying: Are you one of South Africa's producers engaged in best farming practices?
- * The other two were updates on the progress with R & D: (1) Fighting liver fluke; (2) Results of a pilot trial to establish whether isolated bacteriophages will kill Staphylococcus aureus.

D. BACKGROUND INFORMATION FOR THE NATIONAL PRODUCER'S WORK GROUP: Two documents were prepared to facilitate discussion which should also be valuable to the constituencies of the representatives on the Work Group:

- * Genetic and performance improvement of the national dairy herd
- * Environmental challenges and responsibilities of the dairy industry

No Non-achievements / underperformance has been reported

Goal 4 - To advise and assist with national and international managerial, strategic and position publications on any matters which may support the strategic direction of the industry. Advice may also imply representing the industry on government and non-government bodies, but not the IDF which is administered by SANCIDF

Achievements

The DEA developed their "Strategic Plan: Measurement, Reporting and Verification for the AFOLU Sector 2016 to 2020", which addresses targets and time lines for mitigation for the Sector, as well as measures such as taxation if the targets and time lines are not met. The author expressed his concern about the intended taxation on the Agricultural Sector where profit margins are small and agriculture needs to feed the increasing population, and accordingly prepared a Memorandum for discussion at the AgBiz Meeting of 21 July 2016. The Meeting shared the concern and decided to put a team together consisting of members representing the Grain Crops, Horticulture and Livestock sectors to negotiate with the DEA (and when applicable National Treasury) for tax exemption or benefits. The Programme Manager is convener. The first step is to draw up a position paper to illustrate agriculture's commitment to reduce its carbon footprint and provide arguments why the Agricultural Sector should not be taxed. The position paper can then be a point of departure when discussions/negotiations with the DEA and National Treasury commence in 2017. The representatives of Grain Crops, Horticulture and Livestock separately compiled a piece of the draft paper in November/December 2016, which will be consolidated in February 2017.

As discussed early in 2016, the author expressed his concern to the Dean of the Faculty of Veterinary Science at OP on the apparent decline in expertise and R & D capacity in Helminthology and parasite resistance. This affects the total Livestock sector, and for the Dairy Industry in particular the liver fluke problem which is one of the R & D projects of Milk SA. The Dean and senior personnel at OP shared the concern and as result a Chair in Helminthology and parasite resistance was proposed. To put a Chair in place will take some time and therefore the author proposed that for the interim, a position be created that together with a postdoctoral student could initiate training and R & D work. To that effect a motivation was prepared to strengthen the Dean's hand when discussing the option with University management.

No Non-achievements / underperformance has been reported

Income and expenditure statement

Income and expenditure statement	MSA PRJ-0094 Year Report Expenditure of Programme Manager R & D in 2016.docx
Unnecessary spending during period	No

Popular Report

[MSA Meissner Popular Report Year 2016.docx](#)

Additional documentation

No file has been uploaded

Statement

Levy funds were applied only for the purposes stated in the contract	Yes
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Levy funds were applied in an appropriate and accountable manner	Yes
Sufficient management and internal control systems were in place to adequately control the project and accurately account for the project expenditure	Yes
The information provided in the report is correct	Yes