Genomics

Livestock Genomics Workshop

Notes on Workshop held at the ARC Auditorium, Hatfield, Pretoria on 23 November 2012
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1 Terms of Reference

These notes have been drafted by Chris Elfick of Learning Strategies who facilitated the livestock genomics workshop held at the ARC Auditorium, Hatfield Pretoria on Friday 23 November 2012.

2 Background

Significant developments are taking place internationally with the establishment of genomics programmes in various countries. Southern Africa has been considering formalising its approach to livestock genomics for some time. These matters have been discussed at various workshops including a workshop at the University of Pretoria on 16 and 17 February 2012 and a subsequent workshop at the Agricultural Research Council (ARC) on 23 February 2012.

Following these workshops, a task team was established to investigate the formation of a consortium to collaborate towards the establishment of a livestock genomics programme in Southern Africa.

Substantial work and consultations have taken place since these initial workshops within the task team and with various other industry role players and technology agencies.

3 Workshop Objective

The objective of this workshop was to expand the concept of livestock genomics to all stakeholders. The specific objective was stated as follows:

“to engage all livestock genomic stakeholders
to participate in an inclusive collaborative network/consortium
for the advancement of livestock genomics
and genomic selection in South Africa”.

The workshop programme presented the concept of livestock genomics as well as international experiences from Germany and Australia together with inputs from the local Dairy Cattle Industry, the Technology Innovation Agency and DST Bio Innovations.

The workshop agenda is attached as Appendix A. Presentation material and papers where applicable are available for each presenter.

The afternoon session focused on discussing the concept of livestock genomics and genomic selection with the objective of developing a consensus approach to moving forward with genomics in South Africa and the establishment of the consortium.
4 Defining Collaboration

The workshop considered the concept of collaboration and agreed that collaboration would mean the following:

- Sharing of material, data and knowledge.
- Working together for the greater good.
- Working together for a common purpose.

The concept of co-opetition, being the co-operation in certain aspects even between competitors, was discussed. It was agreed that collaboration towards establishing genomics and genomic selection in South Africa could well be defined as co-opetition as industry participants would collaborate in certain aspects but still compete in other aspects in the livestock sector.

5 Expectations from Collaboration

The workshop further discussed the expectations in terms of the outcome of collaboration. The following were agreed:

- Knowledge sharing and better use of technical and other knowledge.
- Avoiding duplication or wastage, particularly avoiding wasted cost were genotypes are done more than once for the same animal.
- Collaboration on the collection of data and samples and the storage of samples and data.
- Strong expectation that collaboration should ensure that the process of genomic selection remains scientifically sound.

6 Definition of Success

The workshop agreed that success in terms of a genomics programme in South Africa could be defined on the following aspects:

- Retaining and building the technical competence and capabilities in the field of genomics within South Africa.
- Establishing the capability to provide genotypes cost effectively and competitively in South Africa.
- Using genomic selection within all forms of livestock farming to improve the quality, safety, nutritious value and economic return from the livestock activity.
7 Scope of Collaboration

The workshop debated the scope of collaboration and agreed the following six components in genomics and genomic selection:

1. Samples
2. Bio bank
3. Genotyping
4. Phenotypes
5. Intellectual property, analysis research and other aspects leading to the creation of the GS key.
6. The GS key and its use in genomic selection.

The diagram below presents this concept.

The workshop debated at length the extent of collaboration that is required and preferable. The workshop reached consensus that while collaboration across the full spectrum of genomics would be preferable in terms of South Africa as a whole and its ability to compete as “team South Africa”. This objective may be a bridge too far in the initial stages.

As an initial target, the livestock sector and individual subsectors, should aim to collaborate on at least areas 1, 2 and 3 where the greatest opportunity exists for avoiding wastage and duplicated costs while at the same time not impacting on the competitiveness or intellectual property of various players in the sector.

The workshop agreed that the target for collaboration in the consortium should be focused around samples, the Bio bank and the ability to produce, store and share genotypic data by making this information available to all industry role-players and stakeholders who participate in the consortium.

8 Consortium Vision

The following vision was proposed for the livestock genomics consortium in South Africa:

As southern African livestock producers, we aim to through a collaboration of Genomic studies and the eventual implementation thereof through genomic Economic Breeding Values (gEBVs) to cost effectively and competitively (internationally) produce protein (all species) for the South African consumer that is cheap, safe, high value, nutritious and good quality, and this all done in a welfare friendly and environmentally friendly way.

The keywords agreed were as follows:

South Africa, protein, collaboration, genomics
9 Task Team

To implement the vision and achieve the collaboration defined above, the task team was mandated as follows:

- To seek to include all breeds and livestock activities in South Africa into the consortium.
- To formally establish the genomics livestock consortium in South Africa through the necessary legal structures and agreements required to formalise the consortium.
- To put in place the necessary protocols to manage the collaboration and co-operation to be facilitated through the consortium.
- To seek to start the process of sample collection and storage through processes which are scientifically sound and acceptable.
- To communicate the activities of the task team and eventually the consortium itself to all stakeholders regularly and comprehensively.
- To specifically engage with all breeds to identify their specific requirements, research targets and objectives as well as their ability to contribute to the consortium and the establishment of genomic selection for that breed.
- To aim to ensure that the capability for genotyping exists within South Africa as soon as possible at a competitive level and with a turnaround capability which matches international alternatives.

All of this needs to be prepared into a comprehensive business plan which should plan the activities of the consortium from 1 April onwards. The business plan should be developed and complete by 31 March 2012.

Based on the business plan, together with the formal documentation to establish the consortium, the task team should seek to obtain mandates and commitments from all breeds and stakeholders for active participation and engagement with the consortium from 1 April onwards.

The ultimate objective of the task team and through them the consortium, would be to ensure that at least one breed has established genomic economic breeding values for the breed by the end of 2013 and that multiple other breeds and livestock sectors have started the process towards collecting the necessary base genomic data to achieve this objective in 2014 and beyond.

10 Technology Innovation Agency Objectives

The workshop was addressed by the Chief Executive Officer of the Technology Innovation Agency indicating their objectives as follows:

- TIA wishes to support the process of making the South African livestock industry competitive.
- TIA has started the process for the development of a feasibility study and at establishing an animal breeding and reproductive technology platform.
- The TIA wishes to co-operate closely with the task team and the consortium.

The TIA as a public entity, requires a properly constituted and formally established consortium which is representative of the livestock industry and all breeds and sectors in order to enable the collaboration and even financial support.
11 Other Issues Identified

The following other individual issues were noted during the discussions:

- The use of open source technologies and models such as the 1000 Bull programme.
- The ideal objective from a single data base.
- The fact that genomic selection keys are breed specific but that there are definite benefits from sharing the process of developing these keys between breeds certainly in the initial stages (referred presentation by Professor Hans Rudolf Fries).

Issues that still need to be addressed include:

- Where and how to send and store samples
- Clarity on the ownership of data
- How to ensure that comprehensive data sets are obtained not just summary codes

The workshop specifically noted that while we do compete between breeds and livestock sectors, our real competition is probably outside of South Africa and that co-operation in South Africa should be our objective in order to compete as Team SA.

12 Way Forward

The following specific way forward was agreed for the task team:

1. Task team - The workshop supported the continuation of the existing task team
   - Other parties offered to participate in the task team and to contribute to its efforts.
   - The task team will act on an open and transparent basis and looks forward to all offers of support and participation (inclusive not exclusive).
   - The task team will engage with various industries and other role players for support and assistance.

2. Business Plan - The main objective of the task team will be to formalise the business plan for the consortium which will include all aspects such as:
   - Protocols and procedures for collaboration
   - Roles of various parties including government and TIA
   - Funding sources
   - Mechanisms to ensure contribution from all parties and participation in the benefits.

3. Formalise Consortium – based on the business plan, the consortium should be formalised and established ideally by the beginning of the next public sector financial year (1 April 2013).

Chris Elfick
29 November 2012
# Appendix A – Workshop Programme

Livestock Genomics Workshop  
23 November 2012  
ARC Central Office, Hatfield, Pretoria  
9:00-16:00  
Registration: 8:00-9:00

<table>
<thead>
<tr>
<th>Title</th>
<th>Speaker</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welcome</td>
<td>Prof Jasper Rees: Head, ARC Biotechnology Platform</td>
<td>9:00-9:05</td>
</tr>
<tr>
<td>Introduction to the Livestock Genomics Consortium</td>
<td>Dr Norman Maiwashe: Programme Manager: ARC Animal Breeding and Genetics</td>
<td>9:05-9:45</td>
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<tr>
<td>Genomics for Managing Breeding Populations in Southern Africa</td>
<td>Prof Hans Rudolf Fries: Chair of Animal Breeding, Technische Universität München (TUM)</td>
<td>9:45-10:30</td>
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<tr>
<td>Tea and coffee</td>
<td></td>
<td>10:30-10:45</td>
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<tr>
<td>An Australian Perspective on the Pitfalls of Investing in Genomics for Australian Beef Herds</td>
<td>Dr Arthur Rickards: Business Development Consultant: Agricultural Business Research Institute, Australia (ABRI)</td>
<td>10:45-11:30</td>
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<tr>
<td>Breeder’s Perspective on Genomic Selection for SA Dairy Cattle Industry</td>
<td>Mr Poena van Niekerk: Dairy Cattle Breeder</td>
<td>11:30-12:00</td>
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<tr>
<td>TIA Animal Breeding and Reproductive Technology Platform</td>
<td>Ms Ravini Moodley: TIA Agri-Biotechnology Sector Portfolio Manager</td>
<td>12:00-12:15</td>
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<tr>
<td>Genomics Research in SA: a DST Perspective</td>
<td>Mr Ben Durham: Director: DST BioInnovations</td>
<td>12:15-12:30</td>
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<td>Lunch</td>
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<td>12:30-13:15</td>
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<td>Facilitated discussion and way forward</td>
<td>Mr Chris Elfick: Learning Strategies</td>
<td>13:15-15:50</td>
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<tr>
<td>Closure</td>
<td>Prof Este van Marle-Koster: Animal Breeding and Genetics, University of Pretoria</td>
<td>15:50-16:00</td>
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