AN EASY WAY TO MONITOR REPRODUCTION MANAGEMENT IN DAIRY HERDS

The ADDED BENEFITS of BIOGAS production on an animal farm

BUFFALOES CONTINUE THEIR MOMENTUM IN GRABBING MEDIA ATTENTION
Welcome to our last edition for 2011! The agricultural sector received an immense amount of publicity this year – ranging from the Green Paper on Land Reform to surely the highlight of 2011, COP 17.

COP 17 not only placed renewed attention on our vulnerable earth and its resources, but also urged US to “get our house in order”. US referring to the world, its people, but more so, its agriculture.

For this reason we are focussing contributions in this edition on renewable energy (”The Western Cape to share in the development of renewable energy”), biogas production (“The added benefits of biogas production on an animal farm”) and water as a critical resource (“Water and agriculture – critical interface for rural development”). An interesting article also focuses on “Crop agriculture, pollination and the honeybee” – those little creatures that we take for granted without realising their pivotal role in our fruit and other agricultural industries.

But it is not only about renewable energy and other mitigate and adaptation issues – it is about climate-smart agriculture as an African and South African priority. Ensuring food security in a changing climate is one of the major challenges facing the globe in the 21st century and for Africa to achieve its development goals, climate change adaptation is a priority. The world, including Africa as the greenest continent, stands to benefit from climate-smart agriculture because of the vulnerability of rural populations to climate change and their dependence on agriculture for livelihoods. The Minister of Agriculture, Forestry and Fisheries, Tina Joemat-Pettersson, has placed the concept of climate-smart agriculture for livelihood. The Minister of Agriculture, Forestry and Fisheries, Tina Joemat-Pettersson, has placed the concept of climate-smart agriculture in the spotlight whilst hosting the 17th Conference of the Parties (COP 17) of the United Nations Framework Convention on Climate Change (UNFCCC).

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We wish you a happy festive season and a prosperous 2012!

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Message from Gerrit van Rensburg, Minister of Agriculture and Rural Development

“The world has seen in the past year that the Western Cape has the potential to be a leader in the generation of electricity from renewable energy. This is due to the Western Cape’s abundance of renewable energy sources such as wind, solar, and biogas. The Western Cape is determined to be a leader in this field and is working towards achieving this goal.”

Carl Opperman, CEO of Agri Western Cape, reacted positively to this announcement. “We need to investigate all the different opportunities available in order to reduce producer input cost, with electricity being a major one.”

Opperman also said this technology could have positive spinoffs such as the creation of additional employment opportunities, and generating income from selling surplus electricity into the national grid. We could do this, whilst at the same time reducing our products’ carbon footprint. “With greener products there is the potential of additional market access for our export products,” Opperman said.

In 2012, Climate-Smart Agriculture will be our slogan – taking agriculture in the Western Cape forward in a climate-smart and resource-wise way! Join us in this effort! We wish you a happy festive season and a prosperous 2012!
THE RED MEAT COMMODITY WORK GROUP APPROACH TOWARDS FUTURE FARMER SUPPORT IN THE EDEN DISTRICT

Introduction
The Commodity Approach in agricultural project support in the Western Cape and the revitalisation of extension aims to ensure improved project success with progressing farmers. Against this backdrop a coordinated/programmed approach to red meat project development and support is followed in the Eden district. The process is coordinated by an established multi-disciplinary Red Meat Work Group consisting of members from the public and private sector as well as the red meat commodity organisations.

This article will point out the broad components involved in programme development with a schematic outline of the development process/timeline.

Components involved in Programme Development and Support

The components’ focus on red meat programme development and support is explained below and shown in context in the total development process in Figure 1. The position of a component in the development process is indicated by its encircled number in the figure.

1 Land acquisition

Farms have been acquired through different processes e.g. private sale, leasing by the farmer, through the (now discontinued) Land Redistribution and Development (LRAD) programme or Proactive Land Acquisition Scheme (PLAS) from the Department of Rural Development and Land Reform. Members of the Work Group aim to be involved in the planning and evaluation of projects as early as possible.

2 Project planning and implementation

Comprehensive plans per project are drafted and scrutinised for resource and economical sustainability. Implementation of the proposed farm systems is executed over several years whilst keeping track of the system and farms’ development needs as well as the knowledge and managerial level of beneficiaries.

3 Monitoring and evaluation of project progress

Monitoring and evaluation is initiated by a baseline survey which includes the following:

- a. Beneficiary social information, perceptions, vision, strategic thinking.
- b. Farm infrastructure: quantity, quality, monetary value.
- c. Equipment: type, quantity, quality and monetary value.
- d. Production capital in terms of stock and animals. • Animals: age, type, herd structure, fibre.
- e. Biological production and efficiency.
- f. Current management practices, knowledge, and perceptions of farmers.

Projects are monitored continuously through the encouragement of record keeping, biological production measurements and analyses (e.g. regular livestock weighing) and economical/financial recording and analyses.

Farms will be measured against each other as well as best practice enterprises and farms within the same homogeneous farming areas.

The initial baseline survey will be followed through the execution of annual evaluation surveys.

4 Support and extension

The annual baseline and subsequent evaluation surveys will be used to identify problem areas. From this a support programme will be drafted to focus on remedial and development support in a structured holistic framework. The aim is to channel all advice, mentoring, training, and other support efforts by the Department of Agriculture and partners through this programme in order to focus efforts and reduce confusion amongst increasing numbers of livestock farmers.

5 Norm development

The need for planning norms, on-farm or experimental farm research is identified through this process and channelled to the responsible Programme for investigation.

Rural layer baseline compilation in the Eden District

Part I: Survey methodology and preliminary observations

1. Background on rural layers in Eden

The Eden District stretches from Riversdale in the west to Ladismith in the north. Several small scale layer units have been established in this area over recent years.

These small, intensively housed layer units vary in size from 300-500 hen units to larger 2000-hen units. They were started in towns like Eersterivier, Haarlem, Uniondale, and Herbertsdale with grants received from the Western Cape Department of Agriculture to confirm the above.

Over time the economic viability of small scale egg producers came under pressure, with economists suspecting high feed prices as well as economy of scale. A study was conducted during 2010/11 by extension officers of the Western Cape Department of Agriculture to confirm the above.

A lack of recorded information regarding the production and economy of these units led to the decision to undertake a baseline study.

The aim of this study was to identify current production activities, to establish why these specific production activities are in use and to determine how they influence profitability.

2. Baseline survey methodology

2.1 Preliminary baseline

A baseline study was initiated with current egg producers, investigating the production and financial potential of intensive layer units under small-scale and rural conditions.

A preliminary baseline study was compiled with information that was gathered from records kept on the project (by the beneficiaries) and secondly from two surveys done by extension officers for two five-day periods.

All the information was then analysed and findings compared between projects. This will be followed by a comprehensive baseline survey to confirm initial findings. The procedure will then be used for future project baseline studies to determine economic viability.

Limited land is required to put up production units and in some cases existing infrastructure can be adapted to house chickens.

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All the information was then analysed and findings compared between projects. This will be followed by a comprehensive baseline survey to confirm initial findings. The procedure will then be used for future project baseline studies to determine economic viability.
The preliminary survey incorporated two five-day recordings on site within the 12-month layer production cycle. Production practices as well as deviations from standard operating procedures were investigated. Standard Operating Procedures (SOP’s) were also examined. Hence, the following Standard Operating Procedures, that will have the biggest impact on the economic viability, were identified.

2.2 Standard operating procedures (industry standards, Agricultural Research Council/food and Agricultural Organisation Poultry Farming and Lohmann Management guides)

- While hens are still growing, feed should be available ad lib up to peak egg mass.
- Average feed intake from 19 to 72 weeks should be 112 g per hen per day.
- A shed temperature of 21°C is recommended. For every drop of 1°C in temperature, feed consumption increases by 1.5%.
- Water consumption at 21°C is 210 litres per 1000 hens.
- Daylight hours must always increase from point of lay (POL) with 1 hour per week up to a maximum of 14 hours per day.
- Feeding space of 64 mm should be allowed per hen.
- Egg production per hen, up to 72 weeks, should be approximately 310 eggs.
- Average egg size up to 72 weeks should be 63.3 g.

Simultaneously with the measuring of inputs and production and the type of production management activities practiced in the layer houses (fig. 2), the execution thereof was also observed in order to identify problem areas. Standard Operating Procedures (SOP’s) were also examined. Hence, the following Standard Operating Procedures, that will have the biggest impact on the economic viability, were identified.

The following activities were recorded:

- Minimum and maximum temperatures in the units;
- Feeding volumes per hen per day;
- Egg production per age group;
- Egg weight per age group;
- Daily activities in the house;
- Interaction between hens at different stocking densities;
- Compersion between birds when there is excessive feed available, and
- Position of the hen in an intensive unit (top or bottom cage).

The layer units were drawn up in diagram form and divided according to the age group of the hens. In the example given in figure 1, the point-of-lay date is on the right. Eggs were counted per identified age group of twenty or sixteen weeks, thereafter Animal Health Technicians of the Department of Agriculture do routine vaccinations, mainly to look at ways of addressing the major cost items to ensure long term sustainability.

3.1 Current Production Activities

3.1.1. Intensive units

- All the intensive houses are naturally ventilated; temperature is controlled by the closing and opening of shade-netting curtains.
- Water is supplied to individual batteries by means of an automated nipple system.
- Feed is given manually twice a day and in some units only once a day.
- Eggs are collected daily by hand, sorted, cleaned, and packed.
- Production records as well as financial records are kept.
- Removal of manure is done on a daily basis.
- Hybrid breeds used for production: Lohmann-Brown and Lohmann-Silver.
- The hens are bought at the age of 18 weeks and then introduced to the different production units.
- The age at which hens are removed from units and sold varies according to their production. Hens are not removed from the system at a standard age.
- Hens receive standard vaccinations up to the age of 18 weeks, thereafter Animal Health Technicians of the Department of Agriculture do routine vaccinations, mainly for New Castle disease.
- Eggs from the units are sold directly to consumers or delivered to small shops in town.

3.2 Deviations observed in production practices

The following deviations that have economic implications were observed:

- Manual feeding per trough space and not per number of hens in the battery leads to under-feeding in some cases.
- Manual feeding is inconsistent because of human error.

- Feed is not available ad lib, causing competition between hens at times when feed is available. This causes under-feeding and stress, as can be seen in Figure 3.
- Hens older than 72 weeks show a dramatic decrease in laying percentage.
- Obstacles to replacing hens: Hens are kept for up to 24 months in the units due to the following reasons:
  - difficulty in the marketing of old hens due to appearance, meat quality and home slaughtering regulations;
  - logistical problems with the acquisition of replacement hens;
  - cash flow problems - it is a big expense to purchase a batch of hens.

4. Conclusion

Small-scale intensive layer units have a valuable role to play in rural communities. They produce a valuable, highly demanded product. The by-products of the system e.g. manure and meat can also be marketed to create additional income.

If improved production practices are implemented and the laying periods of the hens are shortened, income from these units will improve. A support strategy to address identified shortcomings will be implemented to improve productivity and financial viability.

Comprehensive baseline data will be collected within a couple of months and the profitability of the layer units will then be determined. Once this information is available, it will be possible to look at ways of addressing the major cost items to ensure long term sustainability.

Reference:


Figure 2: Manual feeding of hens
Figure 3: Hens competing for feeding space
The importance of aquaculture as a source of fish and other aquatic foods increases dramatically. In 2010 global aquaculture production reached a new level, to the extent that the aquacultural farming industry produced more fish, shellfish and aquatic plants than the traditional fishing industry.

Over a number of years the production of aquacultural species increased and marine farming remained constant or, in some cases, even experienced a decrease. The consistent level of production in certain sectors of the fishing industry is attributed to the fact that it is managed through the application of the principle of maximum sustainability, i.e. the specific source is utilized optimally. In cases where the production levels decrease, it means that the practice is not sustainable. In a South African context, the abalone industry is an example of a source that is not utilized sustainably.

On a continental and global scale South Africa’s aquacultural production is relatively small. In 2008 the total aquacultural industry in South Africa measured 3 654 ton in production volume and had a total value of R327 million. Cultivated abalone (934 ton), oysters (289 ton), mussels (500 ton) and trout (943 ton) comprise the largest percentage of production. The Western Cape leads the production in tonnage with 61% and 83% in value. Most of the farms for the abovementioned species are situated in the Western Cape.

Mussels are only cultivated in Saldanha, with the balance of the consumable product being imported. The current mussel production output of 500 to 600 ton annually, would have to double in order to serve the local market. Local mussel farmers would, however, have to compete with cheaper imports from the East, New Zealand and South America.

It is possible that in five or six years’ time abalone production would have increased to double its current output. Expansion of existing farms would initiate new projects, to be managed by people with vast industrial experience.

It appears as if oyster sales have stabilised in the local market. Some producers are developing new foreign markets.

In the local market there is still space for growth for the trout industry, depending on the international market tendencies for salmon and trout. Trout importation is not a viable option. The possibility of marine fin fish production in cage systems and in land-based recirculation systems is being investigated in the Western Cape, Eastern Cape, KwaZulu Natal and Mozambique.

The aquaculture industry experiences positive growth and there are ample opportunities for new farming projects. The most important factor to keep in mind, is the potential market.
The ADDED BENEFITS of BIOGAS production on an animal farm

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There is currently a lot of interest in biogas production at farm level, with the emphasis on the benefits that farmers can accrue through the use of biogas for heating and electricity generation. However, the indirect benefits of biogas projects are often neglected in cost-benefit analyses, with improved waste management and fertiliser production as key examples. Biogas is produced through anaerobic digestion, whereby feedstock such as animal manure or other non-woody biomass is fed into an anaerobic digester. Bacteria reduce the feedstock to digestate and biogas. Biogas can be used to produce heat and generate electricity, while digestate can be applied as organic fertiliser. By converting raw animal manure into two beneficial products, effective waste management is encouraged.

Most pathogens are significantly reduced during the anaerobic digestion process. Fecal coliform bacteria in digestate solids equal about 1% of that in raw manure, virtually eliminating this major source of water pollution. Pathogens that cause some of the common food production diseases are practically eliminated by anaerobic digestion. Fly eggs are also killed during anaerobic digestion.

Raw animal manure contains volatile organic compounds that produce unpleasant odours. The bacteria in an anaerobic digester break down many of these odour-causing compounds, thereby eliminating almost all unpleasant odours.

Conventional liquid and slurry manure management systems emit large amounts of methane, which is regarded as a serious greenhouse gas. An anaerobic digestion system recovers this methane and puts it to good use. Biogas consists of 50-70% methane and 30-50% carbon dioxide.

Finally, energy from biogas can off-set energy that would otherwise have been derived from fossil fuels, thereby contributing to environmental protection.

Conclusion
Manure produces low biogas yields relative to feedstock from crops. Cattle and pig slurry yields approximately 20 m³ of biogas per ton, while grass and maize silage provides approximately 200 m³ per ton and maize and wheat grain approximately 600 m³ per ton. For this reason manure is often mixed and co-digested with other types of feedstock. Where manure is the only feedstock, fertiliser production and waste management benefits can do much to increase the desirability of anaerobic digestion projects.

In view of the comparative values of these benefits, it may be more appropriate to talk about anaerobic digestion rather than about biogas production in isolation. Anybody considering biogas production will be well advised to also consider fertiliser production and the value of waste management, and should investigate ways of optimising all three benefits. Such a holistic approach has a better chance of economic viability than concentrating on biogas alone.

References
**Abstract**

Renewed interest in soil factors influencing crop productivity led to the initiation of a long-term soil tillage/crop rotation trial. The long-term aim of the project is to quantify the effects of tillage practice and crop rotation on soil physical and chemical properties, and soil biological activity towards gaining a better understanding of soil parameters that will promote sustainability in crop production systems on the shale derived soils of the Western Cape.

Two localities, Langgewens (near Moorreesburg) and Tygerhoek (near Riviersonderend) were chosen to represent typical production areas of the Middle Swartland and Rûens sub regions. Three crop rotations, wheat monoculture (WWW), wheat-medicago/cover (Ww/WWcW/WWMCWcW), and wheat-canola-wheat-lupin (WWW/WWcWcW/WWLWcW) were allocated to main plots and replicated four times. Each main plot was subdivided into four sub-plots allocated to four tillage treatments. The tillage treatments tested were: 1) zero-till – soil left undisturbed (planter places seed with minimal soil disturbance), 2) no-till – soil left undisturbed until planting and then planted with a tined, no-till planter causing maximum of 20% soil disturbance, 3) minimum till – soil scarified (100-150 mm deep) late March/early April and then planted with a no-till planter and 4) conventional tillage – soil scarified late March/early April, then ploughed (150 mm deep) and planted with the no-till planter as described in 2 above. All plant residues were left in place on the soil surface. Crop residues were not burned, baled or grazed.

The zero-till treatments tended to record lower wheat yields compared to the other tillage treatments tested. At Tygerhoek, the zero-till treatment resulted in significantly lower (P=0.05) wheat grain yields during the 2007 (2451 kg ha⁻¹) and 2008 (2652 kg ha⁻¹) production seasons compared to the no-till treatment (2919 kg ha⁻¹ and 2932 kg ha⁻¹ respectively). At Langgewens, the no-till treatment resulted in significantly higher (P=0.05) wheat yields compared to the zero-till treatments for all seasons covered by the study (2007 to 2010). The yield increases recorded in the zero-till treatments at Langgewens could be the result of poor germination and establishment (birds fed on germinating seedlings) of zero-till treatments as well as the populations of ryegrass found in the zero-till treatments. Monoculture wheat (WWW) resulted in significantly lower (P=0.05) grain yields compared to grain yields within the WCW and WWMCWcW crop rotation treatments.

**Materials and Methods**

The trial was conducted on two sites, Langgewens near Moorreesburg (33°16′59.59″S, 18°42′37.97″E) and Tygerhoek (34°8′53.16″S, 19°54′10.98″E) near Riviersonderend. Each trial was laid out as a complete randomised block design with four replications. The three crop rotations, as mentioned above, were allocated to main plots and replicated four times. The sub-plots were divided into four tillage treatments (1) zero-till – soil left undisturbed until planting and then planted with a tined, no-till planter causing a minimum of 20% soil disturbance, (2) no-till – soil left undisturbed and planted with a star-wheel planter causing minimum soil disturbance, (3) zero-till – soil left undisturbed until planting and then planted with a tined no-till planter that results in a maximum of 20% soil disturbance, and (4) conventional tillage – soil scarified to a depth of 100 mm in late March/early April and then planted with the no-till planter as described in 2 above and 4) conventional tillage – soil scarified to a depth of 100 mm to 150 mm in late March/early April and then planted with the no-till planter as described in 2 above.

Analysis of variance was performed using the SAS (Statistical Analysis System) version 8.2 (SAS, 1998). The Shapiro-Wilk test for normality of data was analysed (Shapiro & Wilk, 1965). Least significant difference (LSD) was calculated at the 5% confidence level to compare treatment means using Student’s t-test (Ott, 1998).

**Results and Discussion**

**Yield**

Wheat grain yield (kg ha⁻¹) at Langgewens was influenced (P=0.05) by crop sequence and tillage practice (Table 1). Wheat grain yields at the Langgewens Research Farm for 2007 varied between 3906 and 4894 kg ha⁻¹, whilst lower yields were recorded in 2009 and 2010 (Table 2). During 2007, the McWMcW crop sequence resulted in the highest grain protein content in 2009 and in no significantly lower (P=0.05) protein content of grain compared to the other treatments. Difficulties with establishment of the zero-till treatment and with weed-control (herbicid resistant ryegrass) were reasons for the lower (P=0.05) yield recorded for the no-till treatments at Langgewens.

**Table 1: Grain yield (kg ha⁻¹) of wheat as influenced by crop sequence and tillage practice at Langgewens 2007 – 2010.**

<table>
<thead>
<tr>
<th>Year</th>
<th>Tillage treatment</th>
<th>WWWW</th>
<th>McWMcW</th>
<th>LWCW</th>
<th>CWLW</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>Zero-till</td>
<td>nd</td>
<td>1760 c</td>
<td>5219 a</td>
<td>5441 a</td>
<td>4682 b</td>
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<tr>
<td>2008</td>
<td>No-till</td>
<td>3065 a</td>
<td>4757 a</td>
<td>4744 ab</td>
<td>5360 a</td>
<td>4839 a</td>
</tr>
<tr>
<td>2009</td>
<td>Minimum till</td>
<td>3478 a</td>
<td>3748 a</td>
<td>5219 a</td>
<td>5569 a</td>
<td>4983 a</td>
</tr>
<tr>
<td>2010</td>
<td>No-till</td>
<td>3043 a</td>
<td>4849 a</td>
<td>4744 ab</td>
<td>5360 a</td>
<td>4839 a</td>
</tr>
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Means in the same column and year followed by the same letter are not significantly different (P=0.05)
Means in the same column and year followed by the same letter are not significantly different (P=0.05) [98x197]

At the Tygerhoek site tillage practice influenced mean grain protein content in the 2009 and 2010 production seasons (Table 4). During 2009 the zero-till treatment resulted in lower (P=0.05) mean grain protein levels if compared to the other tillage systems tested. Mean grain protein content in relative low hectolitre mass values (between 68.33 and 75.50) during 2009. The wheat monoculture (WWW) resulted in significantly lower than 77, even as low as 72.60 in the conventional-till treatment (Table 6). The mean hectolitre mass recorded during 2009 for the WWW crop sequence was lower (P=0.05) than for the other crop sequences tested. Except for the zero-till treatment, the tillage treatments tested resulted in relative low hectolitre mass values (between 68.33 and 75.50) during 2009. The wheat monoculture (WWW) resulted in significantly lower (P=0.05) mean hectolitre mass values if compared to the other crop sequences tested. Similar to the 2009 season the 2010 production season was characterised by a significantly lower mean hectolitre mass (75.01) for the wheat monoculture. All the tillage treatments tested resulted in mean hectolitre mass values of less than 77 in the WWW system.

Table 3: Grain protein content (%) of wheat as influenced by crop sequence and tillage practice at Langgewens 2008 – 2010.

<table>
<thead>
<tr>
<th>Year</th>
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<th>McWMcW</th>
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<td>12.25 a</td>
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<td>2.56</td>
<td>6.59</td>
<td>5.14</td>
<td>5.85</td>
</tr>
</tbody>
</table>

Means in the same column and year followed by the same letter are not significantly different (P=0.05) [98x197]

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During the 2008 production season, all tillage treatments in the WWWW crop sequence at Tygerhoek resulted in hectolitre mass values of less than 77, even as low as 72.60 in the conventional-till treatment (Table 6). The mean hectolitre mass recorded during 2008 for the WWW crop sequence was lower (P=0.05) than for the other crop sequences tested. Except for the zero-till treatment, the tillage treatments tested resulted in relative low hectolitre mass values (between 68.33 and 75.50) during 2008. The wheat monoculture (WWW) resulted in significantly lower (P=0.05) mean hectolitre mass values if compared to the other crop sequences tested. Similar to the 2009 season the 2010 production season was characterised by a significantly lower mean hectolitre mass (75.01) for the wheat monoculture. All the tillage treatments tested resulted in mean hectolitre mass values of less than 77 in the WWW system.

Table 6: Hectolitre mass (kg.hectolitre-1) of wheat as influenced by crop sequence and tillage practice at Tygerhoek 2008 – 2010.

<table>
<thead>
<tr>
<th>Year</th>
<th>Tillage treatment</th>
<th>WWWW</th>
<th>McWMcW</th>
<th>LWCW</th>
<th>CWLW</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>Zero-till</td>
<td>17.47 a</td>
<td>17.45 a</td>
<td>17.40 a</td>
<td>17.35 a</td>
<td>17.40 a</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>17.47 a</td>
<td>17.45 a</td>
<td>17.40 a</td>
<td>17.35 a</td>
<td>17.40 a</td>
</tr>
<tr>
<td>2009</td>
<td>No-till</td>
<td>70.55 a</td>
<td>70.55 a</td>
<td>70.55 a</td>
<td>70.55 a</td>
<td>70.55 a</td>
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<td>Mean</td>
<td>70.55 a</td>
<td>70.55 a</td>
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<td>70.55 a</td>
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<tr>
<td>2009</td>
<td>Min till</td>
<td>75.83 a</td>
<td>75.83 a</td>
<td>75.83 a</td>
<td>75.83 a</td>
<td>75.83 a</td>
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<td>75.83 a</td>
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<tr>
<td>2009</td>
<td>Conv till</td>
<td>72.60 a</td>
<td>72.60 a</td>
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<td>72.60 a</td>
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</tr>
<tr>
<td>2009</td>
<td>CV</td>
<td>3.76</td>
<td>3.76</td>
<td>3.76</td>
<td>3.76</td>
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</tbody>
</table>

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WATER & AGRICULTURE: critical interface for rural development

1. Introduction

South Africa is a water scarce country with limited supply management options remaining. The scarcity of water is set to increase in the future due to demographic pressures, socio-economic pressures and climate change (Bilgaut & van den Berge, 2009). To address this challenge we need to critically evaluate water demand management, water supply efficiency, water allocations and alternatives to increasing the supply of water. Such alternatives may include water transfers, water recycling, desalination, rainwater harvesting and unconventional water.

In terms of the agriculture and water interface, the ultimate aim is to maintain food security in the face of increasing urban populations and heightened economic growth. To achieve this it is critical that the interface between agriculture, water and sustainable development be better understood. Water scarcity has implications for food security and the structure of agriculture and constrains the potential for agricultural development. International experience indicates that increasing water for urban development is frequently prioritised over supplying water for agriculture (de Fraine, Wilchens, Rockstrom, Kemp-Benedict, Eryngamy, Gordan, Horntje, Hoogenveen, Huber-Lee & Kartberg, 2007: 103). In South Africa, agriculture, as the largest user of water, is faced with competition from urban water users. This may encourage water allocations away from the agricultural sector through markets or reallocations. The implications for rural development of allocating water away from the agriculture sector needs to be critically examined.

2. The interface between Agriculture, Water & Climate Change

In May 2011, the 1st African Agriculture and Water Dialogue was held in Johannesburg to address the critical interface of the African Water Dialogue to create a platform where agriculture, the private sector, government and climate change experts from across Africa could come together to share knowledge and solutions. The shared experience and expertise could assist in addressing Africa’s challenges in terms of the sustainable development of the agricultural sector.

3. Water Resource Management for Sustainable Development

Within the revised National Water Resources Strategy, emphasis will be placed on addressing the lack of awareness and understanding of the status quo of water use efficiency, its implications for food security and rural development, that the research challenges of the future will be.

At this dialogue, Prof Robin Barnard highlighted shortcomings of the current understanding of the potential impacts on agriculture of climate change (Barnard, 2011). There is a lack of geographical balance in data and literature on observed changes, with marked scarcity in developing countries. Therefore it is critical that the interface between agriculture, water and climate change is within this interface, and its implications for food security and rural development, that the research challenges of the future will be.

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3.1 the Potential Economic Impact of Increased Water

3.1.1 Model, Data and Scenarios

The study is macroeconomic in nature and makes use of Computable General Equilibrium (CGE) modelling. More specifically, a CGE model and Social Accounting Matrix (SAM) developed by Hassan, Thriftow, Roe, Diao, Chumi and Cecilia Punt (2010) that attempts to trace the impact of increasing the irrigation water user charge to save water and the impact thereof on the economy. This policy option is compared to the alternative of realigning water to the domestic and industrial sector. A brief outline of the study and results will be provided in this section.

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An important caveat is that potential employment creation in agriculture must be investigated in light of the apparent job shedding in agriculture - there has been a reduction in permanent employment in agriculture between 2000 and 2007, accompanied by an increase in seasonal employment (Jacobs, 2009). Based on the Labour Force Survey (LFS) employment in agriculture has declined from 1 574 863 workers in March 2001 to 1 072 429 workers in March 2007. More recently Quarterly Labour Force Surveys (QLFS) of 2008 to 2011 suggest a continuation of job shedding in agriculture, with employment declining from 808 004 workers in the first quarter of 2008 to 604 275 in the first quarter of 2011. The structure of employment in agriculture must therefore be further investigated and better understood.

4. Conclusion

Economic development, population growth and climate change all increase the demand for water and the need to manage water resources more effectively. Water management needs to be approached by a search for alternative sources of water, improved land management and improved productivity. Water management tools need to be evaluated critically to ensure policy coherence in terms of achieving developmental goals. To assist in the selection of the right management tools we need accurate information on water use efficiency, water use requirements, the importance of agriculture to rural development, the potential impacts of climate change and the structure of agricultural employment. Water and agriculture presents us with a critical interface for rural development; therefore agriculture has to be identified as a strategic water user in the pursuit of national and rural development goals.

References


Inleiding

Die volstruiskuikwyn word wildegbied dek te deur die volstruiste grootkuiken eers in 1993, wat dan in 1997, 2000 en 2004 gemaak is. In 2008 het Norstruikuikynes in die Western Cape ’n groot toename in kleinkuikwyn behuising en grootkuikynes. Die verkoop van volstruiskuikynes sal ’n groot uitdaging en vereis bestuur van hoogstaande omgewingsbeheer. Die suksesvolle grootmaak van volstruiskuikynes is daarom ’n groot uitdaging en vereis bestuur van hoogstaande omgewingsbeheer. Die suksesvolle grootmaak van volstruiskuikynes is daarom ’n groot uitdaging en vereis bestuur van hoogstaande omgewingsbeheer. Die suksesvolle grootmaak van volstruiskuikynes is daarom ’n groot uitdaging en vereis bestuur van hoogstaande omgewingsbeheer.

Een vertrek (met vier holke) van die kuikens is omgeskak in ’n omgewingsbeheerde eenheid deur die instelling van geïnsuleerde panele en deur, ’n uitsigwaai “extractor fan” en ventilasie openings wat die bestaande vensters vervang het. ’n Verdampingsmuur (“wet wall”) is vir verkoolingsisoleerders teen die buitenste agtermuur aangebring. Die temperatuur, humiditeit en lugvoelo binne in die kamer word automatis beheer deur ’n geprogrammeerde rekenaar. ’n Oomblik gespan gasvoelo is op ‘n hoogte van 2m aangebring in die agterste hoek van die omgewingsbeheerde vertrek. Die verwarmers is so geplaas dat die verhitte lug vanaan die ventilasie openings vertoe beweeg vir meer effektiewe verspreiding van die hitte. In die OKH is oortoefasen langgolf-infrarood verwarmers wat bo- kant die kuikens geneem word gebruik vir verhitting. Hierdie verwarmers is gekoppel aan hittesensors en beheerstelsels wat die temperatuur beheer deur die verwarmers automatis aan en af te skakel.

Die OBS is vooraf geprogrammeer om ’n vasgestelde temperatuur en ventilasie siklus te handhaaf. Die verwarm, ventilasie openings en uitsigwaai word automatis beheer om die temperatuur en ventilasie te handhaaf volgens die geprogrammeerde program.

Plastiek hortjies (“slats”) met ’n grooewa fruiting en kongstrooi is onderskeidelik tydens hierdie studie en vloerbedekking. Die verwarm, ventilasie openings en uitsigwaai word automatis beheer om die temperatuur en ventilasie te handhaaf volgens die geprogrammeerde program.

Die kuikens is tot op 1 maand ouderdom in die kuikenhuis gehou, waarna die proef afgesluit is en die kuikens na ander fasiliteite verskuif is. Die kokkie is nie tydens die proefperiode alhoewel na natuurlike voedselgroei en omstres te beperk. Statisties is daaglikse gemiddelde hou van ammoniak en vog absorbeer en daaglikse gemiddelde hou van die vloeropervlaktes gestrooi om hooi houtkookkrag om te handhaaf. Die bestuurs- en voerprogramme van kuikens was dieselfde in boede die OBS en OKH. Die heersende temperatuur binne die OBS was geprogrammeer om in ’n omgewingsbeheerde eenheid van 29ºC vir die eerste twee weke, met ’n verjonging van 1ºC wekeliks daarna.

’n Pre-aanraansroo son volstruise is ad lib voorsien en vars water was daaglikse beskikbaar om 7h00 en 17h00. Die kuikens is gewig by die aanvang van die proef (dag een) en by die einde van die proef (dag 30). Kuikenvrektes was die mortaliteit van kuikens is daaglikse beskikbaar om 7h00 en 17h00. Die heersende temperatuur is geneem teen 7h00 of teen 17h00 (oopen hurk). Die temperatuur geneem teen 7h00 of teen 17h00 binne (oopen hurk).

**Tabel 1: Gemiddelde en standardafwyking van die omgewingsbeheer en vloerbedekking op die liggaamsgewig en mortaliteite van volstruiskuikens.**

<table>
<thead>
<tr>
<th>Jaargewig (kg)</th>
<th>Maand-oud gewig (kg)</th>
<th>mortaliteit (%)</th>
<th>mortaliteit (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maand-oud gewig (kg)</td>
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<tr>
<td></td>
<td>Hoësigtuieh vloere</td>
<td>SfP</td>
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<td>0.09</td>
<td>0.04</td>
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<tr>
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<td>0.09</td>
<td>0.04</td>
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</tr>
</tbody>
</table>

**Tabel 2: Gemiddelde en mortaliteite van die onderskeie jare se proewe oor behuising- en vloerbedekkingsebehandelings.**

<table>
<thead>
<tr>
<th>Jaargewig (kg)</th>
<th>Maand-oud gewig (kg)</th>
<th>mortaliteit (%)</th>
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</tr>
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<tbody>
<tr>
<td></td>
<td>Maand-oud gewig (kg)</td>
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<td></td>
<td>0.09</td>
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</tbody>
</table>

**Figuur 1. Gemiddelde vir die jaar by vloerbedekking interaksie vir maand-oud gewigte van volstruiskuikens.**

**Figuur 2. Gemiddelde vir die jaar by tipe vloerbedekking interaksie vir mortaliteite tot op 1 maand.**

**Figuur 3. Verskille in gemiddelde temperatuur buite en binne die kuikenhuis.**

**Figuur 4. Gemiddelde variase (standardafwyking) in die temperatuur geneem teen 7h00 of teen 17h00 (oopen kuikens en toe omgewingsbeheerde stelsel) tydens die onderskeie proefopgaansdaaie.**

**Bespreking**

Die tipe behuring het nie ’n groot invloed gehad op vloerbedekking en was die omgewingsbedekking vir die twee houtse nie aanmerklik verskil nie, soos gesien kan word uit die temperatuurdata in Figuur 3 en 4. Die temperatuur binne die OBS is kleiner as die temperatuur binnen (Figuur 4). Die wasing in die OBS was die minste, maar steeds meer as verwag seende dat die temperatuur verander is om volgens’n voorafgeprogrammeerde program beheer te word.
Volstruiskuikens - wat hulle beteken vir suksesvol grootgemaak binne ’n omgewingsbeheerde gebou.

Bedankings

Groot dank is erkenning toe gegee aan Alen D. Godfrey vir hul diep betrekking en die retus van hul manuskript.

Verwysings


TRUFFLES – WHAT THEY ARE AND WHAT THEY MEAN TO SOUTH AFRICANS

This short information article is to introduce you to what these strange ‘things’ are and what they (could) mean to us.

I have heard about truffles before and I have always regarded it as some unaffordable, foreign delicacy. But is the sweet type of chocolate truffles or the obscure earthy ‘thing’ but is dug up by dogs or pigs in European forests.

Of course we also have our indigenous truffles from our own regions, but they are something else altogether, for another article.

Since a few decades ago, we have fortunately been enlightened and the sweet truffles have become much more accessible to us and quite common. However, those ‘obscene, earthy’ truffles are still fairly unknown to the average South African. The reason for this is mostly due to the fact that they occur naturally in European soils, are rather difficult to find and therefore are very expensive and sought after by the Europeans themselves. Until about 20 years ago, the average South African did not travel much overseas and were thus not exposed to the variety of these delicacies that have been admired in the Northern Hemisphere for ages past.

A truffle is a fungus, such as the commonly known mushrooms, but what differentiates it from ordinary mushrooms, is that truffles are always closely associated with the roots of trees. Thus these organisms are called mycorrhizal mushrooms. They live in a close relationship with the trees’ roots, the roots absorbing phosphorus and nitrogen. Truffles’ culinary uses range form range being eaten as slices of the whole truffle on the plate, through to oils infused with it and many more.

Many different kinds of mycorrhizal mushrooms occur. Only a few (the more popular ones) are discussed in this article.

• Black truffles of various kinds with the following common names:
- Perigord black truffle, Winter truffle, Burgundy truffle (2–10cm in diameter), very common all over the world and Chinese truffle, the most important truffle from Asia (10cm or more in diameter). These truffles look very similar and are difficult to differentiate, but they differ tremendously in popularity!
- Italian white truffles (Tuber magnatum) being the most expensive truffles, have reached prices of 5 000 – 8 000 (approximately R50 000 – R80 000) per kilogramme.

They grow associated with oaks and poplars, but are difficult to cultivate, since their spores do not germinate well. They also do not preserve well.

The Perigord black truffle reaches selling prices of between $145 - $500 / kg (approximately R1 015 to R35 035) according to Dr. Ian Hall, truffle researcher from New Zealand.

He has been involved in establishing the truffle industry in his country with the ground breaking idea that truffles can be produced in the Southern Hemisphere and thus delivers this delicacy in the “out” season to the very warm Northern Hemisphere, Australia, New Zealand and Chile already have actively producing plantations. Successful trials have been conducted in South Africa as well.

The southern parts at high altitude in South Africa pose a real possibility for this agricultural business opportunity. Best truffle growth occurs at 16-17 degrees Celsius. Soil pH of 7.8 is optimal and high levels of calcium are necessary. Harvesting time in South Africa would be from about July to September, if truffles were formed in the previous December. It still seem to be a very finite activity, needing expert advice and good research, proven by the fact that even at average temperatures of almost 25 degrees Celsius, truffles are produced in areas in Carolina, USA.

The attached map was prepared by mr Mike Wallace of the Institute for Resource Utilisation at Elsberg. It shows areas in South Africa where the climatic conditions corresponds with other areas in the world where truffles are produced successfully. (Adapted from original table by Ian R. Hall & Allison Frith. For more information see “Farming the Truffle” by Ian Hall, Aleksandra Zambonini & Gordon Brown.)

As with all living organisms, natural enemies of truffles (and their producers) occur. Poppers and willows have competitive fungi that can threat or replace truffles. The truffle tree is also attacked by pathogenic fungi, such as Phytophthora cinnamomi which can kill off a truffle tree. The truffle itself can also suffer from bacterial rot or nematode attack. Further challenges to venturing in the commercial production of truffles include that it requires manual labour, no pesticides or herbicides may be used, no trained dogs or pigs are present for harvesting, research possibilities in South Africa are limited and the cost of all of these, is the fact that us South Africans have no history with truffles! This very intriguing field can be investigated by interested parties via many informative web sites, but also a local company called Woodford, with the following contact details:

tel. +27-21-7913935 • fax: +27-21-7914398
e-mail: mirosct@iafrica.com

At present the Department of Agriculture of the Western Cape does not play any active role in this industry, but enquiries are welcome and can be directed to our Plant Pathology Laboratory at:

tel: +27-21-8085269 • fax: +27-21-8085266

e-mail: mirosc@jfsaftrica.com

Lizette Nowers
Institute for Plant Production
lzetten@elsenburg.com
The Western Cape Agricultural Sector is export driven... 

It should not come as a surprise that the Western Cape Province of South Africa is the main conduit for South African Agricultural exports. After all, it was the need to supply passing ships with fresh fruit and vegetables that resulted in the establishment of a Dutch Colony, with all its consequences, at the Cape of Good Hope in 1652. Whilst the rest of South Africa’s Agricultural Sector focussed on the local market (particularly after the discovery of gold and diamonds resulting in a flourishing domestic demand for agricultural products), Western Cape farmers remained predominantly export focussed. Due to this historical focus on exports and because of its coastal location, South Africa’s institutional and physical infrastructure for the export of farm products is indelibly linked to the Western Cape Province. The result is that 45% of South Africa’s Agricultural Exports is flowing through this province (Produce, 2010) despite its natural resource challenges.

The implication is that the Western Cape Agricultural Sector is proportionally more exposed to the export market for its wellbeing than in the case of South Africa in general. For instance, more than 90% (R2.1 billion) of the income received by the Ostrich Industry originates from the export of meat, skins and feathers (SAOBC, 2011). Similarly, in the case of plums more than 74% of the volume of production is on average annually exported (Horroto 2010) and in the Wine Industry 48.5% of the wine harvest was exported in 2010 (SAWIS, 2011). Even smaller and indigenous industries such as Rooibos sell more than 55% of their products abroad and in certain years it is even as high as 66% of sales (Calculated from PPCEB, 2011).

...but leaves it vulnerable to international change.

It was argued in the AgriProbe of June 2010 that the Western Cape export market is still dominated by Europe and more stringent rules and regulations should be expected (see Troskie, 2010). In the meantime the economic situation in Europe has become increasingly under threat with resulting changes in consumer demand and credit worthiness. Even the United States investment status was downgraded from AAA to AA+ the first time since 1941. The vulnerability of the Western Cape Agricultural Sector to the vagaries of the export market was clearly illustrated by an impact analysis of partial market closure. In the case study it was shown that the closure of 0.45% of the market for South African fresh fruit in 2007 has already cost the industry more than R1 billion. Furthermore, 296 jobs (20.9% black; 48.6% female) were lost and the irrecoverable net farm income were as high as 18.9% in certain areas in particular years (Troskie et al, 2011).

The culture of change in global wine trade...

For casual observers today global wine trade at the turn of the previous century holds a number of unexplored surprises. In 1909 Algeria was single handed responsible for 41% of the 1.654 Mega litres of global exports of Wine. Second on the list was Spain with 19% and then France at 12% of total exports. South Africa, with the rest of Africa, barely contributed 1% to global wine exports. On the import side France imported more than half (51%) of all wines, followed by Switzerland (10%), Germany (7%) and then Brazil, Argentina and the UK each at 4% of global imports. Since then the volume of wine imports has increased more than five-fold and is currently calculated to be 8.632 Mega litres (Anderson & Nelsen, 2011). Especially over the last decade this trend of rapid volume growth can also be observed in value terms. Over the previous ten years the value of wine more than increased from R13.2 billion in 2001 to close to R28.8 billion in 2010 (ITC, 2011). At the same time the relative importance of importing countries has also changed dramatically. Whereas France was the biggest importer of wine at the turn of the previous century (principally from Algeria), the United Kingdom occupied this position in 2001 (20.0% of all wine imports) with France relegated to the 9th and Switzerland to 8th position. The USA was second (17.8%) followed by Germany (13.3%). At that stage Japan (6.0%) was the biggest eastern wine importer. Together the eleven biggest wine importers (all Northern Hemisphere countries) were responsible for 83.1% of wine imports leaving the rest of the world with 16.9% of the value of imports (Figure 1). Brazil, at 0.5% of global wine imports, was the biggest Southern Hemisphere importer followed by New Zealand (0.5%) and Australia (0.4%) (ITC, 2011). By 2010 this picture has again changed dramatically. Although the United Kingdom (15.3%), the United States of America (15.7%) and Germany (9.5%) continued to occupy their respective places as the three most important wine importing countries in 2010, it was with smaller shares of a much bigger market. Indeed, whereas these three countries were responsible for 51% of wine imports in 2001, their combined share declined to 41% in 2010. Canada displaced Japan in the contest for the fourth position and an even more interesting tussle took place at the bottom end of the top eleven countries. Denmark, France and Sweden lost their membership of this club and were replaced by Hong Kong (3.7%), Russia (2.9%) and China (2.8%). As an indication of the market diversification that place in the global wine markets the relatively of countries was responsible for 28.2% of wine imports in 2010; a significant increase from the 16.9% in 2001.

...is picking up pace...

A better picture of the contest is probably provided by Figure 2. Macao and Hong Kong (both markets that are open to allies) as well as China and China itself had growth rates higher than 1500% over the past decade. This information, combined with the data in Figure 1 informs us that this phenomenal growth takes place from an already significant basis. It is worth the while to note that India’s imports grew by 1300% over this period and a number of African countries are also playing in the major league. 

Of particular interest is the fact that a number of established wine importers performed worse than the global average import growth of 115%. These countries include the Nethelands (99%), USA (89%), United Kingdom (71%) and Germany (54%).

...requiring shifts in focus, attitudes and ways of doing business...

It is clear that the changes we are observing on the macro-economic terrain are being reflected in trade patterns: the demand for value added farm products are shifting towards the developing world. Countries such as China and India are becoming increasingly important markets for food products and particularly certain value added products substantially contributing to the Agricultural Sector of the Western Cape Province. However, as this data is freely available and a number of analysts across the globe are coming to the same conclusion, competition in these alternative markets is becoming fierce. For instance, it is reported that Jacob’s Creek, one of Australia’s biggest wine companies, has identified China as a major market for the future. It has not only aggressively entering this market, but has also acquired 30 000 hectares of land to produce wine in China and in this way circumventing cumbersome import requirements (Anderson, 2011). The implication is that, when these markets are entered, it should not be done at a piecemeal approach.
BUFFALOES CONTINUE THEIR MOMENTUM IN GRABBING MEDIA ATTENTION

Senatus, a buffalo bull from the private Thaba Tholo Game Reserve nearby Thabazimbi realised a new South African record price of R179.5 million in a recent auction! This magnificent bull of five and a half years has set a new standard in terms of price per average animal continued to increase in spite of harsh economic conditions.

Buffalo farming seems to be highly profitable as game farmers are increasingly becoming aware of the need to discriminate between sex and age groups within a specific species. If the performance of buffalo as a species is scrutinised, the following interesting statistics are revealed:

Buffalo - bulls (young)

- Average price: R300 000
- Highest price: R80 000
- Number: 20

The total value of buffaloes sold during 2011 as on 06 October 2011 is R197.5 million which in itself contributed more than 40% to the total gross product of game species sold during 2011. No wonder many a commercial farmer is investing diversifying into this kind of alternative agricultural enterprise.

This strong and healthy industry is the way to go when firstly direct income is to be generated through sales, secondly when secondary income is to be generated through ecotourism and arguably the most important spin-off is that important gene pools are now being conserved and expanded to the benefit of both the agricultural as well as the nature conservation industries!

The Department of Agriculture has a comprehensive up-to-date database on the value of individual game species and track is kept of price movement within this industry. All enquiries are welcome and can be made to the author.

The Western Cape has abundant wind, solar and wave resources that can be converted into energy – renewable energy. Renewable energies provide a major opportunity for the province to achieve the multiple goals of energy security, a low carbon economy and employment creation. Up to 50% of the wind energy potential in South Africa is located in the Western Cape, while large sections of the province have excellent solar irradiation. At a global level, renewables are viewed as the “new technological wave”, and a number of countries have set very high targets for replacing coal-fired power with renewable energy. The Western Cape believes that it could become a renewable energy hub for South Africa and the Southern African region.

In August 2011, the national government announced a tender for 1850 MW of wind power, and a further 1450 MW of solar power. We believe that at least 1000 MW of wind and 200 MW of solar PV will be installed in the Western Cape between 2012 and 2014. These power plants will come into operation in the second half of 2014. Wind farms will be located along the West Coast, in the Great Karoo and in the Oberg region, while solar farms will be concentrated in the Karoo region.

Furthermore, the Western Cape is ideally located to serve as a supplier base for the neighbouring Northern Cape, which is estimated to have the best solar irradiation potential in South Africa. The capital investment that will flow into the province over the next decade as a result of renewable energy development amounts to approximately R30 billion.

The strategy of the Provincial Government of the Western Cape (PSWC) with regards to the development of the renewable energy sector starts with the White Paper on Sustainable Energy for the Western Cape Province (2010), which sets targets for energy efficiency and explores ways in which to utilise renewable energy. The White Paper sets a provincial target for energy efficiency improvement of 15% by 2014. This target is expressed in relation to the forecast provincial energy demand at the time, taking into account the national energy demands, and thus allowing for expectations of economic growth. Renewable energy electricity generation in the Western Cape must equal 15% of the baseline energy consumption by 2014. This target is likely to be achieved, as the first utility-scale renewable energy plants are expected to come on-stream by June 2014.

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The policy framework gives rise to a number of key programmes that focus on renewable energy manufacturing as an important economic sector: • creating an enabling environment for investment in the sector (removing red tape, making industrial manufacturing precints available and facilitating business-to-business linkages) • developing the skills supply required for the sector • promoting research, development & innovation in the sector • harnessing national incentives for investment • promoting co-location of companies in the renewable energy value chain. The GreenCape Initiative will support renewable energy manufacturing projects through a clustering approach. One of the key steps in this regard has been to secure access to low-cost land to facilitate the co-location of companies in the renewable energy value chain. Land has been identified in Atlantis, located on the outskirts of City of Cape Town, and the Cape Town City Council has received the first expressions of interest from potential manufacturers. Discussions are also under way with the Small Enterprise Development Corporation and entities such
as Eskom and Sasol with regard to the establishment of a green tech incubation hub in Atlantis. This initiative is aimed at supporting small scale manufacturers in setting up and commercialising concepts and products. It is further envisaged that the Western Cape will be the home of the South African Wind/Renewable Energy Centre (SAREC), which will take responsibility for the training of technical staff in the wind energy sector (artisan level). This programme recognises the excellent research capacity of the institutions of higher education in the province, and the training capability at Technical University and the further Education and Training College levels. All four of the universities are involved in research within the renewable energy field, each with their own work packages.

Current research is engaged with both the refinement of technologies already in application in South Africa as also with the development of new technologies that may have particular application in Southern Africa. The focus is on developing and encouraging cooperation with leading regions in the renewable energy field. Western Cape Universities host a number of students from one sub-Saharan region, thereby facilitating capacity development throughout the region, and gaining recognition as an African leader in the field of renewable energy research and development.

SAREC will continue to host additional wind research & development facilities. The research & development facilities will open opportunities for larger-scale wind technology development than what is currently available within the research institutions in the province. Indications are that the centres will have to be broadened to include training, research & development in other renewable energy technologies.

The municipal waste problem in South Africa represents another key area for renewable energy development. There is growing awareness of the fact that waste is not simply waste – it is potentially an important resource. Biogas, from landfill gas, can be captured from landfill sites, which reduces the amount of greenhouse gas being released into the atmosphere. Potentially, this could be a significant source of renewable energy, and could be a source for trade in carbon credits – credits that can be earned for the reduction in greenhouse gas emissions.

Municipalities are also exploring the possibility of reducing the amount of waste sent to landfill by utilising that waste for electricity generation. The City of Cape Town has undergone a detailed process of analysing the waste streams generated in the City, and has embarked on a process to establish waste-to-energy facilities at several of its waste handling sites. Smaller municipalities have also made varying progress in this regard. The work already done suggests that the quantity of waste and the composition of the waste streams are important factors in determining where a solution to a local problem might be found.

Biomass generated from other sources such as farm produce waste or agro-processing waste has the potential significantly to increase the energy that can be generated from waste. An article in the March 2011 edition of AgriProbe has already explored biomass as a source of renewable energy – in particular in the agricultural context. It was argued that there are significant challenges in the local context – one of which is the cost of the technology where the financial incentives provided by the state are too low to make waste-to-energy projects feasible at farm level. Another issue is whether South Africa will adopt a smart metering system that allows an independent, small-scale power producer to feed electricity into the grid and be paid for what is fed into the power network.

The importance of a pilot project such as the biogas digester on the Department of Agriculture's farm in the George region is that dense vegetation creates different combinations of biomass that could potentially be used to generate not only biogas for electricity generation, but also potentially a quality of biogas that could be used as cooking or transport fuel. This last possibility will be explored more fully in the coming months, as the potential for other forms of biogas (planting crops for the production of biodiesel) may be limited.

Renewable energy clearly holds interesting development opportunities for the Western Cape. The future of power is not necessarily a grid-connected or centrally-planned grid, but a grid that is distributed and decentralised, where small-scale units can feed into the grid and unload, as and when required, to the national grid. This could be a significant source of income for the owners and/or operators of the grid network, and could be a source for trade in carbon credits – credits that can be earned for the reduction in greenhouse gas emissions.

It is expected that the potential development of the waste sector for renewable energy will continue to increase as more small-scale power producers will enter the sector, including members of the agricultural sector.

Selected bibliography


CROP AGRICULTURE, POLLINATION AND THE HONEYBEE

“If the bee disappears from the surface of the earth, man would have no more than four years to live. No more bees, no more pollination... no more man!” (Unknown)

This statement, falsely attributed to Einstein and probably a fairly modern creation, is in fact confirmed by the South African agriculture academy and especially by the honeybee. No more bees, no more pollination... no more man!”

The honeybee is an important pollinator of commercial importance. It is estimated that at least 10% of the crop production on honeybee services. While wild insect pollinators such as butterflies, bees and beetles are also vital (particularly for the pollination services they provide to natural vegetation), no other insect besides the honeybee can be managed by humans in the numbers required for the pollination of large-scale commercial crops. About 50 crops in South Africa are insect pollinated, with these crops collectively contributing over R10 billion annually and supporting at least 100,000 jobs. The flowering trees in South Africa last for a few days to only a few weeks, requiring the services of numerous honeybee hives at the same time. Some 87% of the managed honeybee hives in the Western Cape are used for commercial pollination, with pollination services being responsible for over 60% of beekeepers' incomes.

The strategic importance of honeybees notwithstanding, there is mounting evidence of a global “pollination crisis” with the mysterious disappearances in Europe and North America of hundreds of thousands of managed honey bee colonies, as well as declines in populations of other wild pollinators. The honeybee losses have been termed Colony Collapse Disorder (CCD), an as yet unexplained phenomenon blamed variously on pesticides, environmental pollution, genetically-modified crops, honeybee pests and diseases, the loss of suitable forage for honeybees, and the overworking of managed honeybees needed to service commercial agriculture. In a world, global honeybee populations are ‘stressed’ making them vulnerable to any new perturbation. Thus far South African honeybee populations have not exhibited significant losses, probably because of the relatively unmanaged state of African honeybees, but the recent advent of ‘new’ bee diseases in South Africa suggests that our bees are now more vulnerable and stressed making them even more ‘vulnerable’ to the case.

Understanding the extent to which world agriculture is threatened by pollinator decline is crucial, both for food security and biodiversity conservation, and has lead to the development of the Global Pollination Project. This Global Environmental Facility (GEF) project is implemented through the United Nations Environment Programme (UNEP) and executed by the Food and Agriculture Organization of the United Nations (FAO) in coordination with the governments of seven project partner countries: Brazil, Ghana, India, Kenya, Nepal, Pakistan and South Africa. In South Africa, it is being implemented by the South African National Biodiversity Institute’s (SANBI) Applied Biodiversity Research Division based in Cape Town. The project runs until the end of 2013, and entails carrying out scientific research on pollinators and pollination in three agricultural crops: apples near Elgin and Ceres; onion seed near Duitserlust; and sunflower near Beta-Bella. Each crop is highly dependent on insect pollination, and most of the farmers rely on managed honeybees to ensure adequate pollination. The potential loss of sunflower and onion as a result of a decline in pollinators, and the destruction of what forest species should be planted and where, and better land-use and management of pollinators. The two projects hope to address some of these challenges.

The linkage to the world of managed honeybees is vitally important to the Global Pollination Project in South Africa, and part of the research will investigate the reliance of certain crops on managed honeybees. In South Africa, the managed honeybee industry is reliant on two services that nature provides for (free ecosystem services): 1) forage provision (to sustain the colony and produce honey); and 2) colony replacement (replacement of a beekeeper’s colony stock from the capture of wild bees). Therefore, while the commercial crop grower becomes more reliant on the beekeeper for the pollination service their honeybees provide, the beekeeper in turn becomes more reliant on numerous, and at times controversial, forage sources that can sustain their colonies throughout the year, even when no crops are flowering.

Early research findings in the sunflower region show that both sunflower yield and the abundance of pollinators decreased with distance from natural habitat. The conservation of natural vegetation patches within sunflower farmland could help to increase pollinator diversity, which in turn will help bees move between plants, enhancing cross-pollination. Findings also show that the distance from hives is important for honeybee pollinations, suggesting that additional coloniess may need to be provided during the flowering period to ensure good seed yields. Research will be ongoing into the extent and implications for the future.

With the human world's need for food security, our reliance on the honeybee and other wild pollinators is growing. Therefore, our reliance on forage species for our managed pollinators, and the environments for our pollinators is also growing. However, land use for the sole purpose of pollinator forage or as a pollinator habitat is not standard practice today. So what forage species need to have a primary use (such as forestry, agriculture, conservation, recreation). Strategies for the future will have to include landscape-level thinking, and the knowledge that all habitats, wherever located, support a variety of what forest species should be planted and where, and better land-use and management of pollinators. The two projects hope to address some of these challenges.

There are intimate linkages between crop agriculture, honeybee management, wild pollinators and biodiversity conservation, and these linkages are becoming more important to understand every day.
AgriProbe | December 2011

The 29th congress of the South African Society for Agricultural Technologists (SASAT) was hosted by the Western Cape branch at Phantom View River Resort outside Knysna with “Going Green” as the theme for the congress.

The aim of the South African Society for Agricultural Technologists (SASAT) is to serve the needs of agricultural technologists, under an umbrella body where their specialized talents can be noted, shared and innovated upon, in the interest of progress and improved standard living.

The SASAT consists of 4 branches countrywide which are Western Cape, Mpumalanga, North West and Gauteng. Delegates from over the country attended the congress to present scientific papers and posters, including five technologists from the Institute for Animal Production and Resia Swart received the first prize for her poster, titled “The prediction of oleic and linoleic acid content of sunflower seeds using near-infrared reflectance spectroscopy (NIRS)”.

Bilateral relations between Shandong and the Western Cape Provinces are underpinned by several instruments of co-operation dating back from the year 2000. As part of the implementation of the resolutions adopted during the 1st Regional Leaders’ Summit, the visit to Shandong Province led by Minister Van Rensburg was, in essence, a strategy to promote trade and investment opportunities for the South African wine industry in China and to engage with the Shandong provincial leadership on matters related to opportunities for Chinese companies in the Western Cape.

The delegation comprised of 2 businessmen mainly from the wine industry and senior government officials from the Provincial Government of the Western Cape. The visit, once again, underlined the goodwill that exists towards South Africa with China. Minister Van Rensburg during his meeting with senior officials of the Provincial Government of the Western Cape met with several strategic political figures, business and academic institutions. Among the list is the Vice Governor of the Shandong Province; Mayor of the Yantai Municipality People’s Government; Shandong Department of Agriculture; Shandong Academy of Agricultural Sciences; Yantai Agricultural Bureau and Yantai Agricultural Science. The delegation also met with the senior management of various well-known wine companies in China i.e. Yantai Gisbelle Wine Company Ltd and Yantai Changyu Pioneer International Limited.

The Shandong Province shares lots of similarities with the Western Cape Province as both have a strong agricultural focus. The Shandong Province’s economy grew by almost 3.9 trillion RMB during the last financial year. This makes Shandong the 3rd largest and fastest-growing province in the People’s Republic of China. The province is the lead producer and exporter of agricultural products in China, which was made possible by extensive research into alternative methods of farming and food production. This was also observed during the visits to various institutions and Cooperatives.

Areas of cooperation identified by governments, business and academia include the following: Regional Leaders’ Summit (RLS) Co-operation – The RLS is a high-level platform for sub-national government co-operation to identify specific areas of co-operation in response to the growing needs of the population, especially from an economic development perspective.

- Cooperation in the area of good governance - this concept may provide a good platform for healthy competition between the regional governments within the Forum initiative.

- Yantai International Wine Festival and the Food Festival together to underpin the agricultural component to future bilateral co-operation and used as a platform to promote wine and other products from both provinces.

- Other potential areas of co-operation include agriculture and vegetable production. Since the Western Cape Province has started exploring these it could learn more from Shandong on these areas. A huge potential for vegetable production is attributed to the growing Chinese population in South Africa. Potential also exist for both provinces to exchange researchers and students.

- In addition, more attention needs to be given to the growing demand of healthy products especially the nutritional segment is another possible area of cooperation.

- The Agri Mega Exhibition was also highlighted as another future platform for cooperation as two of the Shandong Province companies have already participated in AgriMega Week 2011. An invitation from Minister Van Rensburg was well received by the Shandong government as agricultural machinery is also one of their strong points.

There was a great interest shown in the South African wines as the Pavilion was always occupied by Chinese wine importers and the public. This was also observed at the South African Gala Dinner that was attended by more than 100 Chinese wine importing companies. This could have been a result of the wide media coverage that South African wines received from the local newspapers and television during the festival. The delegation was advised that producers and exporters attending the festival should regard the event as an important first step in entering the Chinese market. However, a lot of work will have to be done to position South African wines in the Chinese market which is currently dominated by the French. There are already indications of positive results as two of the companies that participated in the event have received orders from the Chinese importers. A commitment to participate to the festival again in 2012 is supported by most of the wineries that took part in the 2011 event.