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Alle landbouwerkers mag deelneem. ’n Landbouwerker is enige persoon wat deel vorm van en ’n bydrae tot die boerdery lewer.

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* Diereproduksie
* Tegniese Operateur
* Besproeiingspesialis

Kategorieë
* Sosiale Ontwikkeling
* Landbou-verwerking
* Voorman/-vrou
* Junior Bestuur
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Pryse

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’n Oorsese studietoer en ‘n ipad

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Gaan na www.elsenburg.com om inskrywings af te laai
Every so often something really useful and exciting comes along, and for readers of the *AgriProbe*, this is it! In this edition, highlights of the work-related activities of staff, programmes and our stakeholders are communicated and shared for the benefit of our numerous readers. The good mix of scientific and non-scientific articles promotes improved understanding and even stronger support for our department.

The day-to-day nuts and bolts of being in the Western Cape Department of Agriculture (WCDoA) and serving the agricultural and agricultural-related community kick off with insight by Minister Alan Winde, MEC for Economic Opportunities, on his recent Budget Vote.

Further in this edition, we distil just about everything relating to effective and efficient utilisation of natural resources and sustainable development. Then there is also some practical and immediately accessible information on sweet potatoes, apples, wildlife, large livestock, sheep shearing, ostrich auctions and special sponsored awards. A thought-provoking article sheds light on the Performing Animals Protection Amendment Act signed off in January this year. Some essential information and compliments from farmers, PAY interns and agri-workers also feature in this edition. Last, but not least, we say farewell to a colleague who retired after an illustrious career. Do not miss the insightful articles in our Journal section, which highlight some of the latest research done in the department.

I will be negligent in my task if I do not thank the management and staff of the WCDoA for supporting farmers in all their endeavours and in our public-image-building programmes.
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ON OUR COVER

In the midst of a number of disasters facing the Western Cape, like drought and crippling fires, it is often difficult to find the rainbow. Our cover feature story, “From apples of the valley to fruits of the world”, is the inspiring story of Anton Alexander, our 2016 Prestige Agri Worker of the Year, who got the opportunity to tour to the Netherlands and Germany. This might just be that bit of colour we are all looking for. It is always heart-warming to see how some people grab opportunities presented to them with both hands. People like this make facing the disasters a bit easier. Better Together.

Image © Guru 3D

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According to the United Nations, agricultural production must increase by 60 percent to meet the demand of the nine billion people who are expected to live on earth by 2050.

Recently, I tabled the 2017/18 budget for the Department of Agriculture. My address came at a crucial time for agriculture. Globally, the sector is emerging as part of the solution to poverty and inequality.

According to the United Nations, agricultural production must increase by 60 percent to meet the demand of the nine billion people who are expected to live on earth by 2050. The Western Cape is poised to play a vital role in meeting this challenge.

In the province, the Gross Value Add (GVA) of agriculture, an indicator of all the goods and services produced by the sector, amounts to R18.6 billion.

Noting the ability of agriculture and agri-processing to dramatically accelerate growth and jobs in our province, we initiated our Project Khulisa economic strategy in 2014 in partnership with the private sector. Our findings showed we could add up to 100 000 jobs to the agri-processing sector, mostly in rural communities across the Western Cape.

When we embarked on Project Khulisa, 320 000 people were employed in agriculture and agri-processing. Today, just over 448 000 people work in these sectors – an increase of 40 percent.

The residents of the Western Cape have also been our important partners in achieving this growth, and I was privileged to have several of agriculture’s ambassadors join me in the House for my budget speech.
In 2016, Rizia Bassa of Bassalicious food sauces received funding to join us at a trade show in China. Rizia landed a contract with a Chinese bakery chain, which will result in a container of Bassalicious sauces being exported every second month. The distributor also awarded her a five-year contract to supply major fast food chains in China. Rizia is making an important contribution to growing our economy and creating jobs.

Agriculture is also playing a role in making sure particularly vulnerable households have access to nutritious food. Since 2014 we have supported 4 000 families to establish community-based food gardens from which to produce their own food. I had the pleasure of meeting Mathilda Frans of the Louwskloof Organic Vegetables project in Mamre. Mathilda and her team were concerned about the high levels of food insecurity in their area and approached us for support in 2015. Today they produce enough food for their households and sell surplus produce directly to their local community.

When we see the difference agriculture can make in people’s lives, it is clear that growth in this sector must serve all residents. That is why accelerating the pace of transformation in agriculture is one of my most pressing priorities. In the past year, we’ve helped over 4 000 smallholder farmers build agricultural enterprises.
One of the beneficiaries of our farmer support programme is Teshwin Toto, a young farmer from the Central Karoo. At just 22 years, Teshwin started farming with 30 sheep on commonage land near Beaufort West. Seven years later, he is farming 400 sheep on Vaalkuil farm. He employs three people and an additional ten residents during shearing time.

Like Teshwin, Vanessa Barends is a future leader of this sector. From Bredasdorp, Vanessa started an internship with the Western Cape Department of Agriculture (WCDoA) after matriculating from Napier High School in 2005. She then obtained a bursary to study at Stellenbosch University. Vanessa completed her master’s degree and developed a calculator that will help small- and medium-sized farming operations determine their carbon footprint on the environment. Today Vanessa is employed as an agricultural economist with the WCDoA.

The children of agri-workers are also a special focus for our department. We had Brayn Stephens joining us in the House. Brayn was raised by his grandmother, Elizabeth Abrahams, who is a pensioner. He received a scholarship from us to complete his studies at the Augsburg Agricultural College in Clanwilliam. Brayn is currently registered for the Higher Certificate at

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**PERSONALISED SUPPORT FOR AGRI-ENTREPRENEURS**

**Farmer Support Development**

to support more than 4 000 farmers

**Agricultural Economic Services**

to deliver advice to over 2 000 agri-enterprises

**Drought relief**

of R47 million set aside

"Accelerating the pace of transformation in this sector is one of my most pressing priorities… we have a determined team in the Department of Agriculture working hard to make this happen.

*Alan Winde, Minister of Economic Opportunities, Agriculture Budget Vote*
Elsenburg College and is a bursary holder of our youth development project.

Another participant in our skills development programme is Macniel Koopman, a young man from Saron who was raised by his grandparents, Michael and Noreen Koopman. Macniel completed matric in 2009 and then worked as a seasonal worker on numerous farms in his local area. He is enrolled for the Higher Certificate at Elsenburg College.

These stories illustrate the impact agriculture can make, particularly in rural communities. We know that when they become self-sufficient, rural families have the economic freedom and the wherewithal to build better lives for their children.

“The Department of Agriculture will continue its hard work to grow agriculture in the year ahead, so that our sector becomes a key player in growing our economy and feeding the world.”
UN brings data to forefront of sustainable development agenda

by Andrew Partridge

In January 2017, the Cape Town International Convention Centre hosted the first ever United Nations (UN) World Data Summit. The event provided participants the opportunity to hear presentations and engage in discussions in order to demonstrate, discover and set in motion ways in which participants can help data become a key driving force towards achieving the Sustainable Development Goals (SDGs) targeted by the UN to be achieved by 2030.

One of the key themes of the conference needs to be made more openly accessible to all. Currently data in the developing world tends to be difficult and costly to access. This is true also for South Africa, which in 2015 scored less than 27 out of 100 on the Open Data Barometer, ranking South Africa 49th out of 92 countries scored. This barometer (www.opendatabarometer.org) is an online tool that measures how openly accessible data is in a country based on scorings on different relevant areas.

The increasing demand for tools that combine statistical and geographic information on an easy-to-use platform is relatively new
DIARY & EVENTS

The Open Data Barometer suggests the developing world, and Africa in particular, has been lagging behind in terms of the degree to which data is made openly accessible. (image source: opendatabarometer.org)

on the global stage, as evident from the fact that the event was the first of its kind. However, the Western Cape Department of Agriculture (WCDoA) has long recognised this need, allowing experts to develop cutting edge innovations. Tools such as Cape Farm Mapper (www.gis.elsenburg.com/apps/CFM), Fruitlook (www.fruitlook.co.za) and the Green Agri Portal (www.greenagri.org.za) have been developed and put into use effectively to the extent of receiving accolades and recognition within and beyond the borders of the Western Cape province.

Examples were used to show the huge potential value of big data for development research and decision-making. “Big data” is a term used for data that is generated passively as people go about their day-to-day business, such as ATM withdrawals, credit card transactions, social media posts or GPS trackers. Access to big data tends to be restricted to the companies who own it and there was a plea to the private sector to follow the lead of companies that have found ways to make big data openly available in a way that doesn’t compromise confidentiality or negatively impact on competitiveness.

There was also a call on government to look for ways to share data collected by authorities for administrative purposes. Whilst this type of data is designed for administrative and not statistical purposes and can have attached political and confidentiality issues, it is a valuable data source for sustainable development, particularly if it can be linked and used together with survey data.

What was clear from the conference was that there is vast unrealised potential in terms of generating and using data for sustainable development research and decision-making. Every person has a role to play in this regard, in the data they create in their day-to-day lives and the manner with which they choose to harness and make this data available for others. Even departments like WCDoA that are at the forefront of regional data initiatives, have room to do more and it is important that officials continually innovate to stay ahead as they lead the way for other organisations to follow.

For more information, contact Andrew Partridge: andrewp@elsenburg.com

Sustainable Development Goals

The Open Data Barometer suggests the developing world, and Africa in particular, has been lagging behind in terms of the degree to which data is made openly accessible.

(image source: opendatabarometer.org)
Preheat oven to 180 °C. Combine oats, almonds and seeds in a medium bowl. Heat honey and olive oil until the honey is runny and add the black pepper and salt. Pour the honey mixture over the oats and stir to coat evenly.

Turn the mixture onto a non-stick sheet and bake for 5 minutes. Remove from oven and stir through. Return to the oven for a further 5 minutes.

Finally remove from the oven and mix grated Parmesan cheese through. Once cooled completely, break the granola into clusters and store in an airtight container.
MORE DELICIOUS RECIPES will follow in the next editions of AgriProbe.

Scan the QR code or visit www.elsenburg.com/resource-library/cape-made-taste-alternatives to download the recipe.

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**Parmesan granola with char-grilled lettuce**

**To Assemble**

- 6 baby gem lettuce heads
- olive oil
- 200 g Black Pepper Flavoured cream cheese

1. Heat griddle pan until very hot.

2. Cut lettuce heads lengthwise in half, brush a little olive oil on the cut sides and grill until charred lines are visible.

3. Arrange the grilled lettuce on a serving platter and spoon the cream cheese on top. Sprinkle with Parmesan granola.
Oudtshoorn-navorsingsplaas
Inligtingsdag & broeivolstruisveiling
deur dr. Anel Engelbrecht en prof. Schalk Cloete

'n Groep broeivolstruise wat onder die hamer gekom het.
Die jaarlikse produksieveiling van broei-volstruise op die Oudtshoorn Navorsingsplaas is op 14 Maart gehou. Die afslaer was P.A. Geldenhuys van Klein Karoo (Edms.) Beperk. ’n Totaal van 103 broeivolstruise is teen ’n gemiddelde prys van R3 558 verkoop. Die hoogste prys wat vir ’n tweejaar-oue wyfie betaal is, was R5 500, terwyl die jong mannetjies slegs R4 000 gehaal het. Daar was ses kopers, met Jurie Klue van Klaarstroom wat die hoogste prys betaal het en Joey Potgieter van Oudtshoorn wat die meeste volstruise gekoop het.

Die volstruise wat te koop aangebied is, is afkomstig van die navorsingsplaas se hulpbronkudde. Met volledige data vir reproduksie, groei- en slageienskappe is die kudde enig in sy soort ter wêreld. Die beskikbaarheid van die data maak dit moontlik om volstruise met teeltwaardes vir reproduksie en gewig aan te bied. Die volstruise word individueel opgeveil per katalogus, met volledige inligting oor die volstruise se ouderdom, gewig en teeltwaardes vir gewig en reproduksie om voornemende kopers te help met besluitneming. Die volstruise kan ook voor die veiling besigtig word.

Die veiling is voorafgegaan deur ’n inligtingsdag waar verskeie lesings aangebied is. Wessel Lemmer, senior ekonom van Absa Besigheidsbank, het oor makro-ekonomiese tendense en huidige tegnologiese ontwikkelings gepraat, terwyl Willem Burger van die Wes-Kaapse Departement van Landbou (WKDL) oor ekonomiese tendense en geleenthede in die Klein Karoo gepraat het. Verder is veral gefokus op produksienorme vir die volstruisbedryf en die optimale slag-ouderdom, met baie klem wat op velgehalte gelê is.


Vir meer inligting, kontak:
Dr. Anel Engelbrecht: anele@elsenburg.com
Prof. Schalk Cloete: schaikc@elsenburg.com
The Branch: Agricultural Development and Support Services in essence represents the development and implementation functions within the department. These functions include Farmer Support and Development, the provisioning and promotion of training through the Elsenburg Agricultural Training Institute, coordination of Provincial Rural Development and Sustainable Resource Management.

One of the realities of the spatial analysis of our Western Cape economy is that agriculture is the lifeblood of the rural economy. Without agriculture, our rural areas will cease to exist. We also know water and other natural resources are key to the sustainability of agriculture.

Further, without a well-trained network of people with a passion for agriculture, we will not succeed in optimising on the value agriculture can bring to the economy, and therefore to shaping people’s lives for the better. Finally, the key to sustainable agriculture is to ensure farmers are supported with advice, counsel and the best methods for optimal benefit to all.

It is against this backdrop that the department is excited to announce the

EMPOWERING COMMUNITIES; IMPROVE LIVES

Spotlight on Darryl Jacobs, Deputy Director-General: Agricultural Development and Support Services

by Douglas Chitepo

“The key to sustainable agriculture is to ensure farmers are supported with advice, counsel and the best methods for optimal benefit to all.”
appointment of the Deputy Director General for Agricultural Development and Support Services, Darryl Jacobs.

Darryl has more than 34 years’ experience in the public sector, having served government in various capacities, such as financial manager in former Deputy President Thabo Mbeki’s office, head of Transport Operations in the Department of Transport and Public Works (Western Cape), as well as a short stint as head of department in said department.

He is a fellow of the Eisenhower Institute based in the USA and has a postgraduate degree in Business Management. One of his driving passions is to improve the lives of people through empowering vulnerable communities. He believes this can be achieved best through the role agriculture plays within society and the economy since, at its most basic level, this sector is responsible for putting food on the table.

Darryl strongly believes all stakeholders within the agricultural sector, both within and outside the department, have an unbelievable chance to shape the lives of communities in the Western Cape. He is honoured to serve the agricultural community in this capacity and hopes agriculture will benefit from his contribution.

His goals:

1. Entrenching the transformation agenda in order to achieve sustainability in agriculture.
2. Leveraging partnerships with stakeholders. He recognises and appreciates that Government cannot do everything, and that partnerships with the private sector and other stakeholders are essential.
3. Ensuring extension and support services are more responsive.
4. Creating the space for agri-workers, who are the most vulnerable, to be respected and affirmed.
5. Facilitating market access and strengthening economic opportunities.
6. Strengthening the economic capabilities of the agricultural sector.

For more information, contact Douglas Chitepo: douglasc@elsenburg.com
Martha Klein was die wener van die Junior Bestuur-kategorie en is ook aangewys as die 2016 Sentraal Karoo Landbouwerker van die Jaar.

Sy is gebore en getoë op die plaas Baakensrug buite Nelspoort, waar sy 18 jaar reeds in die slaghuis werksaam is en tans die slaghuis bestuur. Haar pligte behels die bewerking van die karkasse van die verskillende spesies, insluitend springbok, koedoe, gemsbok en blouwildebees. Sy is ook verantwoordelik vir die koördinering van bestellings en monitering van die koelkamerse temperatuur, wat minstens vyf keer per dag nagegaan moet word.

Martha se kundigheid is bekend in die gemeenskap en selfs buurplase bring hul karkasse om deur haar bewerk te word. Tans is sy die enigste vroulike landbouwerker in die Nelspoort-omgewing wat 'n kode 10-bestuurslisensie het en word as 'n rolmodel in haar gemeenskap beskou.

Om as streekwenner aangewys te word het vir Martha meer selfvertroue gegee en sy wil die platform gebruik om “meer vir haar mede-landbouwerkers te doen”. APA
Johnny Cornelissen was die wenner van die Tegniese Operator-kategorie en is ook aangewys as die 2016 Bergrivier Landbouwerker van die Jaar.

Hy het as 'n algemene werker op Laborans, 'n boerdery-eenheid van JD Kirsten (Edms.) Bpk., begin en werk reeds 19 jaar daar. Hy is die hoof tegniese operateur op die plaas en neem oorhoofs toesig oor al die vragmotorbestuurders, chemiese opera- teurs, alle voertuie en implemente.

Johnny se belangstelling in meganiese herstel verseker dat Laborans se vloot voertuie in 'n goeie toestand bly en deur middel van sy instandhoudingswerk op die plaas help hy ook kostes bespaar. As 'n opgeleide vurkhys-operator help hy om palette uitvoerdruiwe te laai en verseker hul veilige vervoer tot by die koelkamers.

Hy is doelgerig en gryp elke geleentheid wat by die werk aangebied word aan ten einde sy persoonlike ontwikkeling te verbeter. Volgens Johnny het hy nie verwag om as die streekwenner aangewys te word nie. Hy verwys na die ervaring as uitdagend, maar dat hy "tog bo uitgekom het". 

Vlnr: Danie Niemand (Wes-Kaapse Departement van Landbou), Johnny Cornelissen (2016 Bergrivier-streekwenner) en Pieter van Zyl (Freshmark, Shoprite).
Olivia Theunissen, streekwenner —
Overberg Prestige-landboutoekennings

deur Erika Manho-Damons

Olivia Theunissen was die wenner van die Algemene Werker-kategorie en is ook aangewys as die 2016 Overberg Landbouwerker van die Jaar.

Sy is die afgelope drie jaar werksaam op die Wildekrans Wynlandgoed waar sy as ‘n algemene werker met sagte vrugte, olywe en druïwe werk. In die wingerd kan sy take verrig soos snoei, oplei en suier. In die vrugteboorde kan sy selfs ‘n span lei om te pluk en vrugte te sorteer. Olivia pak alles wat sy doen met ywer aan en probeer altyd die ekstra myl gaan ten einde gehalte werk te verseker.

Olivia glo “hierdie toekenning sal deure en geleenthede vir haar toekomsplante oopmaak”. Hoewel haar ambisie sterk na vore kom, beskou sy ook vrou-wees in landbou as ‘n uitdaging. Die plaas se bestuur ondersteun haar egter deur middel van blootstelling aan kursusse en die boerdery se verskillende produksie-eenhede.

Met harde werk en deursettingsvermoë kan Olivia beslis haar droom om haar eie pakhuis te besit en te bestuur verwesenlik.
Uben van Rooyen was die wenner van die Middelbestuur-kategorie en is ook aangewys as die 2016 Breedevallei Landbouwerker van die Jaar.

Uben is reeds vir die afgelope 21 jaar werkzaam by die Werda Boerdery in die Nuy-vallei. Sy pligte sluit in die bestuur van die werkswinkel en al die gereedskap, hantering van dissiplinêre prosedures, die in- en uitboek van vragte en opdatering van lone. Uben help ook met die bestuur van parsreëlings, organisering van spanne in besige tye en die beplanning van daaglikse take op die plaas.

As middelbestuurder beskik Uben oor die vermoë om mense te motiveer om altyd beter te presteer, wat gevolglik ’n positiewe uitwerking op die boerdery se produktiwiteit het. Hy kan baie goed op sy voete dink en probleemplossing is een van sy sterkpunte.

Uben beskryf sy wen as “gerustelling in die gawe wat hy ontvang het en bevrediging in sy gemoed”. Vir hom beteken sy wen dat hy iets reg doen in die landbousektor.
From apples of the valley to fruits of the world
by Erika Manho-Damons

Anton Alexander, a human resource officer from the farm Ouwerf near Villiersdorp, walked away with the laurels at the 2016 Western Cape Prestige Agri Awards gala ceremony hosted at the Nederburg Wine Estate in November 2016.

He not only won the coveted title of Western Cape Agri Worker of the Year, but also received prizes such as an iPad sponsored by Daleen Turner Consultancy, a R20 000 Shoprite voucher as well as a cash prize of R20 000 and an overseas study tour to the value of R60 000, both sponsored by the Western Cape Department of Agriculture (WCDoA). By winning this award Anton also became a member of the MEC for Economic Opportunities’ Prestige Agri Worker Forum, consisting of previous winners.

Anton was especially excited about his imminent overseas trip. This trip became a reality when Anton, together with a group of small-scale farmers, was afforded the opportunity to go on a market access study tour organised by the WCDoA during
February 2017. This tour to the Netherlands and Germany was aimed at providing the delegates with a greater understanding of the agricultural supply chain and to broaden their knowledge through visits to various components within this chain and engagements with different role players.

The tour consisted of visits to the World Port Centre in Rotterdam, Rotterdam Fruit Wharf, the Food Centre in Amsterdam, Fruit Logistica in Berlin, different retailers and farming enterprises as well as engagements with Netherland Agro, Food and Technology (NAFTC), the South African Netherlands Chamber of Commerce and Wageningen University and Research. All these visits and engagements, Anton says, gave him a comprehensive understanding of the different phases in the export and supply chain processes.

He describes the visit to Fruit Logistica in Berlin as “a different ball game and insightful in many ways”, as he was able to engage with fruit and vegetable producers, wholesalers and retailers from all over the globe. This year Fruit Logistica, one of the world’s largest exhibitions, hosted over 76 000 trade visitors from 130 countries and over 3 000 exhibiting companies from 84 countries.

This market access tour was invaluable to Anton and a definite highlight in his life as it enabled him to learn more about the sector and industry he operates in on a daily basis. He further encourages agri-workers to take full advantage of every opportunity that comes their way and to participate in initiatives such as the annual Western Cape Prestige Agri Awards, presented by the department and Shoprite. He views development and education as tools to achieving success. AP

For more information, contact Erika Manho-Damons: erikam@elsenburg.com

Anton Alexander (far right) with the WCDoA’s delegation and Jan Hak, President of NAFTC (far left).
Dr Buks Olivier, Scientific Manager: Animal Sciences in the programme Research and Technology Development Services, retired at the end of March 2017.

Since his appointment in 1978 at the then Grootfontein Agricultural College, Dr Olivier was closely involved in research. From 1980 to 1982 he acted as responsible officer of the Klerefontein experimental farm. After returning to Grootfontein, he completed his PhD in 1989. He managed the animal production group at Grootfontein from 1990 to 1996. During 1996 he joined the Agricultural Research Council and became responsible for small stock improvement.

Under his management the small stock scheme was transformed into a vibrant and progressive scheme. Dr Olivier received several awards for his contribution to small stock improvement, including the Animal Improvement Officer of the Year and an honorary award from the Grootfontein Old-student Union.

His contribution to animal science was recognised by the South African Society of Animal Science with a silver medal for his contribution to livestock improvement. He also received the floating trophy for the best paper published in the South African Journal of Animal Science in 1997, and again in 2007 when he co-authored the best paper. The Agricultural Writers’ Association awarded him the Central Region Agricultural Scientist of the Year award and in 2013 he...
received an accolade from the Federation of Small Stock Breeders’ Societies for his lifelong contribution to small stock improvement.

Research by Dr Olivier was published in 35 contributed scientific papers, theses, invited reviews and book chapters in the accredited scientific literature as senior, sole or co-author. Additionally nine papers as senior author were published in accredited, refereed conference proceedings, while 37 abstracts as senior, sole or co-author were published in conference proceedings or books of abstracts not subjected to peer review. He presented five invited papers at international scientific meetings as senior author and acted as co-author of another two invited papers. He also (co)supervised four MSc and one PhD theses.

Dr Olivier joined the Western Cape Department of Agriculture at Elsenburg during 2010 as Scientific Manager and whilst his work focused more on the management of the directorate, he still maintained contact with the small stock scheme and was involved in routine tasks, as well as the development of new technology for application in small stock recording. This resulted in two recent MSc studies and one recent PhD study using data from the scheme under his co-supervision. He also served on various research committees of the industry.

Under Dr Olivier’s leadership the directorate Animal Sciences excelled and the impact and outputs from the research effort were clearly visible in the sector.

“In 2013 he received an accolade from the Federation of Small Stock Breeders’ Societies for his lifelong contribution to small stock improvement.”

For more information, contact Dr Ilse Trautmann: ilset@elsenburg.com
Resia Swart, senior tegniese beampte by die Direktaat vir Dierewetenskappe op Elsenburg, het onlangs haar meestersgraad by die Nelson Mandela Metropolitaanse Universiteit (NMMU) cum laude geslaag en ook die Cape Wools SA-toekenning vir haar werk ontvang.

Haar werk het daarop gefokus om Naby Infrarooi Spektroskopie (NIRS) kurwes te ontwikkel om die chemiese samestelling van verskeie plaaslike grondstowwe sowel as volvoere te bepaal. Resia het onder meer in haar werk kurwes opgestel om die chemiese samestelling en vetsuur-inhoud van sonne- 

blomsaad, chemiese samestelling van heel en gemaalde kanola- en lupienesaad, asook die chemiese en aminosuur-samestelling van lusernhooi en volledige volstruisvoere te kan bepaal.

Ontledings met die NIRS word teen 'n fraksie van die koste en tyd van die ontledings volgens tradisionele tegnieke gedoen.

Haar studieleiers vir die projek was prof. Tertius Brand (spesialis-wetenskappe by Direktaat vir Dierewetenskappe op Elsenburg) en Maryna Lehmann-Maritz (senior dosent by die George-kampus van die NMMU).

‘n Onlangse artikel in die SA Graan/Grain-tydskrif oor die kanola-evalueringsprogram in die Wes-Kaap is bekroon as die beste artikel vir die maand van Februarie. Dit kom dan ook in aanmerking as moontlike artikel van die jaar.

Die sukses van die program is te danke aan 'n klein span wat soos 'n goed oilede masjien saamwerk onder die tegnieke bestuur van Piet Lombard en Lisa Smorenburg.

Kultivar-evaluerings in kanola, koring en voergaan speel 'n belangrike rol in die kleingraanbedryf van die Wes-Kaap. Produsente sien watter kultivars die beste aangepas is vir hul gebied.

‘n Onlangse artikel in die SA Graan/Grain-tydskrif oor die kanola-evalueringsprogram in die Wes-Kaap is bekroon as die beste artikel vir die maand van Februarie. Dit kom dan ook in aanmerking as moontlike artikel van die jaar.

Die sukses van die program is te danke aan 'n klein span wat soos 'n goed geoliede masjien saamwerk onder die tegniese bestuur van Piet Lombard en Lisa Smorenburg.

Vir meer inligting, kontak dr. Johann Strauss: johannst@elsenburg.com
Studies on ovine resistance to infestation by ticks are scarce, both in the local and international scientific literature. With this in mind, Ketshephaone (Tshephi) Thutwa was recruited into the PhD (Animal Sciences) research programme of the University of the Free State to study ovine tick resistance on indigenous and commercial sheep breeds maintained at the Nortier Research Farm in a joint study between the University of the Free State, the Western Cape Department of Agriculture and Stellenbosch University. During this study, Tshephi was on leave from the Department of Animal Science, Botswana College of Agriculture where she is permanently employed as a lecturer at the Botswana University of Agriculture and Natural Resources.

With her thesis entitled: “Comparison of genetic and immunological responses to tick infestation between three breeds of sheep in South Africa”, Tshephi contributed to the existing scientific knowledge on ovine resistance to tick infestation. An indigenous fat-tailed breed, the Namaqua Afrikaner, generally had lower tick loads than the commercial Dorper and SA Mutton Merino breeds. There was favourable heterosis for lower tick loads as well as an increased weaning weight in the cross of Namaqua Afrikaner rams with Dorper ewes relative to the midparent value. Crossbred lambs thus resembled the Namaqua Afrikaner for tick loads and the heavier Dorper for weaning weight. No effect on tick loads was observed in Dorper-SA Mutton Merino crosses, although these crosses also exhibited heterosis for lamb weaning weight.

Further studies on cellular infiltration, gene expression and hypersensitivity reactions also pointed to distinct breed differences, and contributed to a better understanding of the underlying biology contributing to the greater tick tolerance of the Namaqua Afrikaner. The study increased the present understanding of ovine tick-host interaction and factors contributing to breed differences in tick loads.

The PhD degree in animal breeding was conferred to Tshephi during the winter graduation ceremony of the University of the Free State in Bloemfontein. She was jointly supervised by Prof Schalk Cloete from the Directorate Animal Sciences, Prof Japie van Wyk from the University of the Free State and Prof Kennedy Dzama from Stellenbosch University.

For more information, contact Prof Schalk Cloete: schalkc@elsenburg.com
TRAINING AND AGRI-SECTOR NEEDS SHOULD GO TOGETHER

Introducing Dr Harry Swatson, Director: Further Education and Training, Elsenburg Agricultural Training Institute

by Giselle Terblanche

Q: Tell us more about your academic background and work experience.

A: I have a Bachelor of Science (Honours) degree in Agriculture from the University of Science and Technology in Ghana. In 1997 I completed a Master of Science Degree in Agriculture (cum laude) at the University of KwaZulu-Natal. After working for a brief period, I continued my postgraduate studies at the University of KwaZulu-Natal and was awarded a PhD in Agricultural Science in 2003. I have also completed several certificate courses in development and training at local and overseas institutions. I have significant professional and progressive experience within the fields of agriculture, research, development, extension and training.

Prior to this position, I was acting principal at Cedara College of Agriculture. Other positions held included Further Education and Training (FET) manager at Cedara and a research position at the University of Venda. I serve on several committees, such as the African Poultry Network.

Q: Why did you decide to join the Western Cape Department of Agriculture?

A: I saw the opportunity for personal growth, improvement, achievement, satisfaction and happiness. I realised there is a niche area within the agricultural value chain that the Elsenburg Agricultural Training Institute (EATI) could take advantage of.

Q: What does your position entail?

A: Management, resourcing and capacitation of the sub-programme FET as well as identification of the training needs required by the sector within the entire value chain. It also entails formulating accredited skills programmes based on the training needs analyses and vertically integrating the college with communities, other colleges, farmers etc. This includes formulating short specialised courses, learnerships and skills programmes to identified target groups. I also need to ensure an effective FET marketing strategy and its implementation, covering all ethnic and gender groups.
Furthermore it entails facilitating the articulation of FET programmes to the Higher Education and Training programme.

**Q: What is your vision for the college?**

**A:** I would like to position the college to deliver on its training mandate along the entire value chain and to continue to be one of the best agricultural training institutes nationally and abroad. I’ll be focussing on getting the basic tasks done quickly. I will be looking at transforming all possibilities to enhance the quality of education and training at the EATI into reality.

The FET will be encouraged to re-enforce the alignment of training to the requirements of the agricultural sector and the department. Furthermore the possibility of implementing vocational-based accredited skills programmes, especially on agri-processing of animal and plant products, will be investigated.

The scope of offerings at the college will be expanded to include vocational-based training at NQF levels one to four. Recognition of prior learning programmes will also be put in place. Other envisaged training programmes will include four- to six-week programmes in permaculture, organic farming and more. I want to enhance agricultural or agricultural-related partnerships further by enabling Elsenburg to work on a new dimension with various institutions/commodity groups, with which I have excellent working relationships.

**Q: What is your impression of the department thus far?**

**A:** It has a deeply rooted organisational culture that goes hand in hand with a strong and respected leadership. All operations are effective and there is a visible pursuit of the principles of best practice. The atmosphere has been supportive and my efforts so far have been highly appreciated.

**Q: What makes you angry?**

**A:** Unprofessionalism and unproductive behaviour.

**Q: What makes you happy?**

**A:** Being able to share my knowledge and skills with others, learning new things or being innovative in dealing with challenges, being able to build healthy relationships with family, colleagues and supervisors.

**Q: The book you are reading at the moment?**

**A:** *The Power of Positive Thinking* by Norman Vincent Peale.

**Q: If you could have dinner with anyone, dead or alive, who would it be?**

**A:** Nelson Mandela.

For more information, contact Giselle Terblanche: gisellet@elsenburg.com
PRESTASIE BY SKEER- EN WOLHANTERINGSKAMPIOENSKAP

deur dr. Jasper Cloete


Die jaarlikse geleentheid, gereël en aangebied deur die NWKV, maak deel uit van "n landwye kompetisie waar skeerders en wolhanteerders kan kwalifiseer om deel te neem aan die nasionale kampioenskap in Bloemfontein. Die vier bestes in elke afdeling kwalifiseer om aan die nasionale kompetisie deel te neem.

Vier Elsenburg-studente het deelgeneem in die beginner-wolhantering-skategorie en een student in die junior-masjienskeer-skategorie. Die studente, wat almal nog net een vierdaagse wolkursus en een weeklange skeerkursus gedoen het, het deelgeneem teen deelnemers wat voltyds skeer en wolklassering doen.

Die dag begin met uitdunne van die beginner-wolhantering. Twee wolhanteerders neem per rondte deel en die kompetisie behels die volgende: Terwyl ‘n Skeerder ‘n skaap skeer, moet die deelnemer die penswol klassifiseer. Sodra die skeerder klaar die penswol afgeskeer het, word die mik van die skaap geskeer waar die deelnemer alle vuil en onaantreklike wol moet verwys en in aparte mandjies moet klassifiseer (CBP, BP, LOX1, LOX2, LOX3).
Die hanteerder moet ook sorg dat hy nie die skeerder in die skeerproses hinder nie. Die kuif- en wangwolle moet ook verwys word sodat daar nie haarvesels is wat die vag wol kan kontamineer nie. Daarna word die vag afgeskeer en die hanteerder moet sorg dat daar geen dubbele knipsels op die vag beland nie.

Nadat die skeerder klaar geskeer het, word die stophorlosie aangesit en moet die wolhanteerder die vag netjies op die woltafel gooi (waarvoor punte toegeken word) en dan moet die vag deeglik afgerand word en die afrandsels moet sorteer word in die regte lyne en in verskillende mandjies geplaa word. Nadat die vag afgerand is, word dit in ’n ander mandjie geplaa.

Tydens die hele proses is daar drie beoordelaars wat die deelnemer beoordeel en alle foute aanteken. Die wolhanteerder moet die hele skeerprocess sowel as die tafel en onder die tafel en die tid en klasmerkte van die deelnemer neem. Nadat die hanteerder klaar sy wol geklassifiseer het, ken die beoordelaars die punte af en das die deelnemer tyd en klasmerkte in minder as twee minute klaar geskeer het. Met oefening behoort Pierre in die toekoms baie goed te vaar.

Daar was 18 deelnemers in die beginner-wolhanteringskategorie en die Elsenburg-studente het as volg gevaar:

S.M. Mbakaza – 5de plek
M.C. Wagner – 7de plek
A.L. Abrahams – 9de plek
P. Rabe – 10de plek


Vir meer inligting, kontak dr. Jasper Cloete: jasperc@elsenburg.com

Photos © Mark and Anna Wilson
“I want to become the link between South Africa and the rest of the world for Shalala Meat Export.”
Good Day Honourable Mentor,

My name is Hishaam Albertyn. I am from Mitchells Plain and finished matric at The Leadership College, which is based in Manenberg. I’ve been part of the group of PAY Interns for about 10 months.

I want to take this opportunity to thank you, respectfully, for everything you’ve done for me during the year 2016. I have truly learnt a lot from each and every one. Your assistance means a lot to me, and the things you’ve taught me I will surely carry with me for the rest of my life. Yes, the year had its ups and downs but that’s true about everything in life.

Here is just an example of what a positive impact the Department of Agriculture had and still has on my life. Unfortunately, I failed Mathematics in matric and therefore was unable to get into university to study agricultural management, which I had applied for. Then, I applied to be part of the Department of Agriculture’s PAY Internship because when I got to grade 10 I realised my passion was agriculture. Then the year went past, with many activities and training sessions, until I applied for college. With the permission of the Almighty, I got accepted at Elsenburg College as well as Boland College in Worcester. Today, I am settled in a hostel in Worcester and attending the Boland College studying a three-year National Diploma in Farming Management.

Thank you very much to each and everyone for every effort in trying to get me to where I am now. I am extremely grateful for the opportunity. I am not in direct contact with our HOD, Ms Joyene Isaacs, but if I could I would tell her this and I feel it’s important for her to know.

“I always said I want to become the ‘Joyene Isaacs’ of the department.”

Initially when I started at the department as an intern, I always said I want to become the “Joyene Isaacs” of the department. And I then took the rest of the year to think of how my passion fits into the equation. I attended the FSD Business Planning Session where many things were discussed. Being a Muslim and one of three Muslim interns in the year, something came up in the discussion about Shalala Meat Export. I paid attention to every single thing that was discussed during the session, but this was the most interesting part for me. I went back to my private life after this session and did some research. Today, I stand on a decision that I have made based on my little knowledge – I want to become the link between South Africa and the rest of the world for Shalala Meat Export.

In conclusion, I know the email is quite long, but I need to say I am very grateful for the opportunity that was given to me by the Department of Agriculture and I hope each and everyone will keep me in their prayers.

Yours sincerely
Hishaam Albertyn
The Performing Animals Protection Act is an old act and has been amended many times over the years to make provision for welfare concerns with respect to certain animals. In 2011, after a poor decision by a magistrate in awarding a license, the National Society for the Prevention of Cruelty to Animals took the matter to court claiming magistrates do not have the specialised knowledge required to make decisions about animal welfare. The Constitutional Court agreed and ordered that the law should be administered by the Department of Agriculture, Forestry and Fisheries (DAFF) instead of the Department of Justice. This required that the Act be amended to allow a national licensing officer (NLO) to issue the licences. The welfare responsibility now resides in the veterinary public health division of DAFF.

The process to amend parts of the Act, as well as the Regulations, is a painstaking process, but the President signed the Performing Animals Protection Amendment Act (Act 4 of 2016) and the updated Regulations were published in the Government Gazette on 19 January 2017. These amendments are expected to be implemented by June 2017 in accordance with the most recent Constitutional Court instruction. The NLO will delegate his/her power to issue or withhold licences to state veterinarians.

“Apart from animal health checks, many aspects covered in the VPN are required to be approved or endorsed by a facility veterinarian.”
veterinarians (SV) of the province or a state animal scientist in the absence of a SV, in whose area the animal facility is located. A veterinary procedural notice (VPN), which forms the basis for a licence application inspection, was developed to assist the SV in this task. Apart from animal health checks, many aspects covered in the VPN are required to be approved or endorsed by a facility veterinarian, such as a health and welfare plan for all the species/animals, the area allocated to each species, including shelter, feed and water points, examination area, storage and disposal of waste and mortalities, animal training (equipment and methods), as well as associated records and registers. Disaster management plans should also be considered. Biannual veterinary visits will therefore be required.

There are distressing inconsistencies in the old Act, such as which performing or working animals need licences and which are exempted. These days it is also more correct to use the term “working animals” rather than “performing animals”. These inconsistencies are however outside of the scope of the current amendments and will hopefully be addressed in future with an envisaged comprehensive Animal Welfare Act, which will probably take several years to pass all the consultative, legal and parliamentary processes.

There is currently an Animal Welfare Working Group, formed in 2014, comprising of DAFF staff tasked with welfare and a SV representative from every provincial Department of Agriculture, as well as a representative from the Department of Environmental Affairs, who are assisting DAFF with this process. AP

For more information, contact Dr Annelie Cloete: anneliec@elsenburg.com
“The Export Control programme is responsible for the auditing of all abattoirs, processing plants and dairy establishments that wish to export animal products.”
Export Control in the Western Cape is assisted by 10 state veterinarians who are responsible for managing and controlling the exportation of live animals (pets or otherwise) and products of animal origin from the Western Cape Province. They facilitate the certification of these products in accordance with international norms and standards. The Export Control programme is responsible for the auditing of all abattoirs, processing plants and dairy establishments that wish to export animal products. These facilities are audited once a year to ensure compliance with the registration requirements of the Department of Agriculture, Forestry and Fisheries (DAFF) as well as import requirements of the various countries they wish to export to.

A survey was conducted at the end of 2016 in order to evaluate the quality of our services with the goal being to determine the needs and expectations of our clients. Participants of the survey were obtained from an online client database. The survey was restricted to clients only and all responses were anonymous. A total of 563 personalised invitations were sent to individual clients via email and 158 responses were received. This represents a 28% response rate, which is good considering...
Clients were divided into different groups: private individual (pet export), cold store/distribution centre, factory and export agency. Clients were asked to evaluate various aspects of establishment audits, export certification processes and administrative support using a rating scale where ‘1’ indicates poor and ‘5’ indicates excellent. The results were averaged per client group and a grand total average was calculated.

### Evaluation of establishment audits

<table>
<thead>
<tr>
<th></th>
<th>Cold store/distribution centre</th>
<th>Factory</th>
<th>Export agency</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quality of audit notifications</strong></td>
<td>4.6</td>
<td>4.24</td>
<td>4</td>
<td>4.28</td>
</tr>
<tr>
<td><strong>Technical competence of auditors</strong></td>
<td>4.9</td>
<td>4.44</td>
<td>5</td>
<td>4.78</td>
</tr>
<tr>
<td><strong>Presentation of auditors</strong></td>
<td>4.9</td>
<td>4.59</td>
<td>5</td>
<td>4.83</td>
</tr>
<tr>
<td><strong>Timelines from auditing to issuing of ZA certificate</strong></td>
<td><strong>4.22</strong></td>
<td><strong>3.29</strong></td>
<td><strong>2.5</strong></td>
<td><strong>3.34</strong></td>
</tr>
</tbody>
</table>

### Evaluation of export certification

<table>
<thead>
<tr>
<th></th>
<th>Private individual</th>
<th>Cold store/distribution centre</th>
<th>Factory</th>
<th>Export Agency</th>
<th>Unspecified</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application for export in person</td>
<td>4.33</td>
<td>4.64</td>
<td>4.23</td>
<td>4.3</td>
<td>4</td>
<td>4.28</td>
</tr>
<tr>
<td>Application for export over email</td>
<td>4.5</td>
<td>4.22</td>
<td>4.18</td>
<td>4.25</td>
<td>3</td>
<td>4.17</td>
</tr>
<tr>
<td>Presentation of reception services at Milnerton</td>
<td>4</td>
<td>4.08</td>
<td>4.23</td>
<td>4.67</td>
<td>4</td>
<td>4.23</td>
</tr>
<tr>
<td>Quality of export consignment inspection by VPVO</td>
<td>4.25</td>
<td>4.6</td>
<td>4.38</td>
<td>4.55</td>
<td>4</td>
<td>4.43</td>
</tr>
<tr>
<td>Quality of export certification services</td>
<td>4.6</td>
<td>4.35</td>
<td>4.21</td>
<td>4.31</td>
<td>4.33</td>
<td>4.27</td>
</tr>
<tr>
<td>Presentation of the veterinarian issuing export certificates</td>
<td>5</td>
<td>4.56</td>
<td>4.42</td>
<td>4.54</td>
<td></td>
<td>4.48</td>
</tr>
</tbody>
</table>
Auditing of establishments received ratings of 4 or higher with regard to quality of audit notifications, technical competence of auditors and presentation of auditors. This demonstrates that the quality of the service being delivered to clients is of a high standard. Timelines from auditing to issuing of ZA certificate were rated an average of 3.34, indicating clients were unhappy about the length of time it takes for a certificate to be issued after an audit has taken place.

The department was severely short-staffed during 2016 as there were two vacant posts for state veterinarians within the export certification office. The export industry has been growing by 20% per annum and due to the lack of staff, the workload on the remaining veterinarians was overwhelming. The two vacant posts have been filled as of April 2017 so an improvement with regard to the timeline can be expected. It is also important to bear in mind that once audits have been completed, they also need to be approved by DAFF. Unfortunately, the department has no control over the time it takes for DAFF’s approval of these audits.

In the survey clients were also asked to comment on and make suggestions about areas they felt needed attention. It was mentioned that the website did not contain enough information regarding audit criteria and policies. All of the relevant information sheets, veterinary procedural notices (VPN) and policies have now been uploaded online (www.elsenburg.com). An information sheet highlighting the differences in the roles of Western Cape Government vs DAFF will also be drafted. Another concern was that there is no Export- and VPN-specific training for exporters in the Western Cape. A training course with one of the larger retailers was trialled and will be further refined.

Despite being short-staffed it can be concluded that clients positively reviewed Export Control during 2016. Veterinary services and the staff of Export Control would like to thank its clients for participating in the survey. AP

For more information, contact Dr Azeemah Parker: azeemahp@elsenburg.com

“Veterinary services and the staff of Export Control would like to thank its clients for participating in the survey.”
The Western Cape Department of Agriculture (WCDoA) recently held a feedback session on the issues raised at the 2015 West Coast Agricultural Summit. 

The 2015 summit came about after concern was aired during a 2014 IDP session with the Bergrivier Municipality, namely: What is the future of agriculture in the Swartland and the broader West Coast? As the question was posed to the WCDoA, the Head of Department (HOD), Joyene Isaacs, instructed senior officials to organise the 2015 summit. 

At the 2015 summit the guest speakers presented current trends in agriculture as well as the challenges within the land reform delivery chain. This set the scene for intensive discussions on the topics. 

**Issues raised during these discussions included:**

- The land reform process: lack of communication and support
- Selling of “black-owned” land
- Financing models
- Mentorship
- Social decay
- Agriculture as a career

In reply to the discussions and feedback, Joyene promised stakeholders the WCDoA would host a feedback session concerning issues raised and progress made. This culminated in the 2017 West Coast Agricultural Feedback Summit, held on 22 February 2017. This event was attended by the WCDoA, several municipal representatives, stakeholders and 70% of farmers who attended the 2015 summit. 

The WCDoA set the scene by highlighting their success stories, opportunities available at the research farms and other support systems available to farmers. Farmers were also encouraged to attend agricultural events.

The department also gave feedback on some of the deliverables since the last
summit:
• World Food Day in Graafwater
• Various municipal engagements
• LREAD Desk to support land reform
• Short skills courses presented
• 149 household food gardens
• Student learnership programme
• Financial information day
• Rural development coordination
• Demonstrations, farmer days
• Agri-worker household census
• More than 800 farm visits
• Prestige Agri-worker competition
• More than R12m drought support
• Career exhibitions
• Cederberg Expo
• Connect Agri engagements
Presentations on veld management practices during drought cycles and the future impact of climate change and population growth on resources within the area were also delivered.

The different municipalities gave feedback, highlighting their challenges as well as successes. The numerous projects, initiatives and work in progress are testimony that the stakeholders in the West Coast are serious about making a success of agriculture in the area.

Feedback from the municipalities:
Bergrivier – established a working committee forum to look at upcoming businesses and SMMEs and a SMME Expo is planned.
Swartland – their main focus is youth development and developing communities.
Matzikama – access to land and water is their big challenge.
Saldanha – there is no easy access to water and quarterly meetings with the WCDoA and other stakeholders are held to address social reform.
Cederberg – water is still a challenge and lease agreements were issued to farmers.
DRDLR gave feedback on the amount budgeted for the Ebenhaezer restitution project. The process of land acquisition and the 1 Household, 1 Hectare Project were explained in detail.

In summary, the municipalities are doing their part in developing the communities and specifically the agricultural communities in their areas. The stakeholders were pleased that the WCDoA had the various services available and were delivering these within the West Coast municipal area. The progress made and service delivery initiatives started since the last summit were applauded.

Farmers were also grateful for the drought relief support provided by the department.

All municipalities, farmers and other stakeholders were appreciative of the feedback session as it was a platform for all to network and strengthen working relationships. The audience agreed the future of agriculture in the West Coast is looking promising. AP

For more information, contact Jerry Aries: jerrya@elsenburg.com

Joyene Isaacs, Head of Department
Conserve rangelands through sustainable utilisation

A visit to Canada brings a message home

by Nelmarié Saayman

Every four years an International Rangeland Congress is held in another part of the world. In July 2016, the 10th congress, themed “The future management of grazing and wild lands in a high-tech world”, was held in Saskatoon, Saskatchewan, Canada. A total of 574 delegates from 58 countries met to discuss this important topic. Twenty-four delegates represented South Africa, including Annelene Swanepoel and Nelmarié Saayman from the programme Research and Technology Development Services, directorate Plant Sciences in the Western Cape Department of Agriculture.

Under the sub-theme “State of Global and Canadian Rangeland and Pasture Resources”, Nelmarié and co-authors presented a poster entitled: “Does grazing management matter in the arid Koup region of the Karoo, South Africa?” and under the sub-theme “Multiple Use of Rangelands” they presented a poster entitled: “Possible
One of the overall messages of the congress was conservation of our rangelands through sustainable utilisation with livestock and wildlife, while taking care not to over-utilise our rangelands. A farmer, Hyland Armstrong from Canada, said by using innovative and flexible veld management strategies it is possible to use livestock grazing as a tool to manipulate the biodiversity and endangered species’ habitat to improve the health of the rangeland. He stressed that, to maintain biodiversity, it requires cooperative efforts of farmers, government agencies (national and provincial), NGOs and environmental groups. Several other speakers also stressed this collaboration, especially to ensure that the research findings also get to the practitioners.

Many papers mentioned the use of technology and tools to streamline research and make information available to farmers, and to utilise it in their day-to-day management decisions. Barry Adams, rangeland extension specialist from Canada, mentioned that these “knowledge tools” should be made more accessible to land users.

The delegates also took a three-day pre-congress tour to the south of Saskatchewan. The vegetation of south Saskatchewan is Canadian prairie with large areas of native grasslands (short grass prairie), planted pastures and crops, mainly canola, wheat and lentils. Grasslands and pastures are mainly used for beef production. Only 20% of native grasslands remain in Saskatchewan, the rest are planted under rehabilitation methods of abandoned crop-lands in the Cederberg Mountains, South Africa.”

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One of the overall messages of the congress was conservation of our rangelands through sustainable utilisation with livestock and wildlife, while taking care not to over-utilise our rangelands. A farmer, Hyland Armstrong from Canada, said by using innovative and flexible veld management strategies it is possible to use livestock grazing as a tool to manipulate the biodiversity and endangered species’ habitat to improve the health of the rangeland. He stressed that, to maintain biodiversity, it requires cooperative efforts of farmers, government agencies (national and provincial), NGOs and environmental groups. Several other speakers also stressed this collaboration, especially to ensure that the research findings also get to the practitioners.

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pastures and crops. Their average annual rainfall is 300-400mm with a 30 year wet - 30 year dry cycle and they also experience extremely dry years.

The Beaver Creek Conservation area covers an area of 86 000ha just south of the city of Saskatoon. The main focus of this visit was the control of invasive species and restoration of old lands.

The pre-conference tour joined one of the field days at the Outlook research station. This field day was organised by the Saskatchewan Irrigation Projects Association, Agriculture and Agri-foods Canada, the University of Saskatchewan, Saskatchewan Ministry of Agriculture and Irrigation Crop Diversification Corporation. The format of this field day was similar to local information days and attracted around 200 people.

“At the Swift Current Research and Development Centre the group met with

“The Grasslands National Park is one of two conservation areas in Saskatchewan run by the federal government, with an area of 900km² and a herd of 300 genetically pure plains bison.”
For more information, contact:  
Nelmarié Saayman: nelmares@elsenburg.com  
Annelene Swanepoel: annelenes@elsenburg.com  

Drs. Michael Schellenberg and Alan Iwaasa. It is the only federal facility in the semi-arid region of Canada and the only facility with a programme that examines native plant material for its utilisation and benefits. They also do research on crops and planted pastures,” says Nelmarié. The Grasslands National Park is one of two conservation areas in Saskatchewan run by the federal government, with an area of 900km² and a herd of 300 genetically pure plains bison. It is also home to the endangered burrowing owl and threatened prairie dog. Over-utilisation is prevented through annual sales of the surplus bison.

The Valjean Community Pasture is part of the Saskatchewan Pastures programme, which provides grazing on provincial government land, together with all management services for participating (paying) farmers. The farm is 13 250ha in size with animals of 39 different farmers. This programme is mainly for farmers who do not have enough grazing land of their own.

“Experiencing agriculture in Saskatchewan was indeed exciting and inspiring!” says Nelmarié.
The SmartAgri plan, launched in May 2016 (refer to Agriprobe Vol 13 No 2, 2016) and with the vision “Leading the way to a climate-resilient agricultural future for the Western Cape with a coordinated sector plan”, has set the scene for focused action and implementation in the agricultural sector. The plan has been widely acknowledged by the agricultural sector as one of the best plans developed for the sector. Furthermore, owing to its position as a highly vulnerable sector, agriculture is the first sector in the province to benefit from a sectoral climate change response framework and plan.

The plan presents the “road map” for the agricultural sector to travel towards a more productive and sustainable future, despite the uncertainties around specific climate projections. The detailed background to the plan, its four strategic focus areas, six priority projects, regional and commodity briefs and case studies, as well as proposed actions, are available on www.greenagri.org.za

Putting the plan into action

Although developed after intensive stakeholder engagements, the SmartAgri plan has to be taken back to the sector with focused and well-coordinated actions to enhance the resilience of our farmers and other stakeholders. In this regard the department will play a coordinating and catalytic role to give impetus to the implementation of the plan. In this short article, a few actions on implementation are shared.

Shortly after launching SmartAgri, the 2015/2016 drought and heat wave led to losses of 200 000 tonnes of wheat (50-100% per farm), 230 ha of potatoes and 15% of fruit, with 3ca. 17 000 cattle requiring fodder assistance. The department, in partnership with the Department of Environmental Affairs and Development Planning (DEADP) – also a partner in developing the SmartAgri plan – hosted a provincial multi-stakeholder Drought Dialogue in June 2016 as part of the SmartAgri roll out to discuss the
current drought, lessons learnt and ways to mitigate drought conditions in the future. Agreement was reached on a set of 32 high-priority, actionable interventions for the provincial government to strengthen the response to the current and future droughts. These were further refined to five areas for immediate attention. An action plan for these priorities has been developed under the guidance of the Drought Task Team of DOA, in partnership with Agri Western Cape and AFASA. The Drought Dialogue priorities aligned closely with key areas identified in the SmartAgri Plan and were testimony to the valuable input of our stakeholders during the development of the plan.

In order for the SmartAgri plan to be rolled out in a more effective way, Dr Stephanie Midgley, former project leader during the development of the SmartAgri plan, was appointed as a specialist advisor for a period of 12 months, commencing 1 September 2016. Since her appointment, Dr Midgley has assisted the department with presentations at various internal departmental events, commodity organisations, study groups, stakeholder organisations, municipalities, commented on climate change documents and proposals and attended various meetings on national level. Various popular publications were also published on climate-smart production practises. The SmartAgri Steering Committee continued to convene quarterly to keep the momentum going on the implementation of the plan. Climate change advisories were prepared by DEADP and forwarded to all municipalities for incorporation into their respective Integrated Development Plans.

The vision of The SmartAgri plan is “Leading the way to a climate-resilient agricultural future for the Western Cape with a coordinated sector plan”. Scan the QR Code or visit www.youtube.com/watch?v=1HRnJwMkJNc to watch the video: ‘Climate-Smart Agriculture in the Western Cape’.
Research gaps identified during the development of the plan have been communicated to all tertiary institutions and innovative ways to appoint post-graduate students to climate-smart projects are currently being explored.

Conservation Agriculture (CA) has been identified as one of the six key priority projects that will fast track climate change resilience of the agricultural sector in the Western Cape. The first working group of these six priority projects was convened early in April to ensure that CA will also be expanded to other crops and livestock. A CA Community of Practice is currently being institutionalised. The department also approved two new climate-smart research projects, i.e. the “Rehabilitation of abandoned potato circles in the Sandveld area of the West Coast” and “Quantifying between and within animal components of variation in common indicators of heat stress in Western Cape resource flocks”. Furthermore the department has committed its continued financial support to the GreenAgri portal and Agri-sector desk hosted by GreenCape to act as a support tool to our stakeholders enquiring on and operating in the green and climate-smart space. New and exciting developments and features on the GreenAgri portal are currently being implemented.

A brand-new newsletter on SmartAgri will also be launched soon - watch this space for more climate-smart news.

In the next edition of *Agriprobe*: A progress report on the Alternative Crops Fund as one of the support mechanisms for climate-smart production.

**For more information, contact**

*Dr Ilse Trautmann:* ilset@elsenburg.com
Murraysburg is a town of approximately 5 000 people situated in the far northeast of the Western Cape province. It is governed as part of the Beaufort West Local Municipality within the Central Karoo District Municipality.

**History**

The “leiwater” (irrigation) infrastructure was the lifeline of the community of Murraysburg for more than a century (since 1886) and provided water to many home gardens in the town. This resulted in food production (vegetables and fruit) and also provided job opportunities for the local inhabitants of Murraysburg. The 1988 flood damaged the intake structure in the Buffels River and since the then local authority decided not to repair the weir, the system fell into disuse. The result was that little vegetables or fruit were produced locally and all needed to be imported from as far as Port Elizabeth, with the associated high price the poor local people cannot afford. Significant job losses also took place with few opportunities for other jobs in the area, apart from the few jobs on the nearby farms.

Boreholes provided a small volume of water to the “leiwater” system that was not sufficient for the demand and at a high operational cost, which was not sustainable. The then Murraysburg Environmental Forum, representing all the town’s inhabitants, requested assistance from the...
department with the rehabilitation of the “leiwater” system as the local Beaufort West municipality did not have the funds. Murraysburg is one of the development nodes in our province and the rehabilitation of the “leiwater” system could contribute significantly to the development of the town.

The funding was made available through reprioritisation of our departmental budget. Staff from the department’s Sustainable Resource Management programme did the survey and compiled the tender documents after which Casidra called for tenders for the first phase refurbishment of the weir, canal, storage dams in town (the so-called Rooidamme) and the associated water infrastructure equipment. The tender was awarded to a local contractor, Vastrap Grondverskuiwings BK, and the refurbishment started in September 2016.

Casidra acted as implementing agent for the project with Chris Barr of the Murraysburg Environmental Forum, transformed into the Murraysburg Sustainable Development Council, acting as the eyes on the ground for the project.

The project was completed in late November 2016 and the first water was transferred into the now one storage dam, with a bird haven island in the middle. Good
rain in the catchment area of the Buffels River during January 2017 resulted in the emotional first filling of the storage dam in more than 29 years, to the delight of the whole community.

Benefits of refurbishing the system
For a relative small amount of R1.5 million many benefits will accrue to all stakeholders in the town, including:

a. The re-instatement of a reliable water supply to the original “nat erwé” in the town. This will result in the creation of many jobs in town and the production of fruit and vegetables at an affordable price for the community.

b. The re-instatement of a reliable water supply to the original “saailande” on the north-eastern boundary of the town. Once again jobs will be created and fodder can be produced for the animals of the community.

c. The creation of one or more recreational areas for all residents in the town.

d. The beautification of the town through:
   i. a constant water supply to the remaining trees in the town streets,
   ii. re-instatement of a visually attractive natural feature at the eastern entrance to the town, and
   iii. availability of water to sustain new projects to replace trees and other forms of flora in the public spaces in the main thoroughfares of the old town.

e. This initiative will ultimately lead to new direct outside investment into the town, which will in turn result in an improvement in the quality and value of the town’s revenue base.

Way forward
The “leivore” (irrigation canals) in town will now be refurbished by making use of local unemployed people to ensure that fruit and vegetables can be grown locally again, after “importing” it from Port Elizabeth at astronomic prices for many years.

The result of the department’s dedicated efforts and relatively small amount of money is job creation to the locals and fresh fruit and vegetables being available to the community.

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Is carbon tax a reality for dairy farmers?
Josef van Wyngaard, Robin Meeske and Lourens Erasmus

How to reduce on-farm enteric methane production
Josef van Wyngaard, Robin Meeske and Lourens Erasmus
Is carbon tax a reality for dairy farmers?

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Introduction

Global warming or climate change per se transforms and threatens current and future global natural resources. This paper gives an overview on greenhouse gasses (GHG) as global warming instigators and builds-up to the proposed South African carbon tax. Methane emissions from dairy cattle are the main focus throughout the paper. Questions such as ‘What is the methane output of a cow?’, ‘Are cows blameable for global warming?’ and ‘Is carbon tax a reality for dairy farmers?’ are addressed. The need for a carbon tax is explained and, unfortunately, also why it might not be enough. The aim of this paper is to address inaccurate information with regards to cattle and methane emissions and to prepare the farmer for the upcoming carbon tax. A follow-up paper focuses on on-farm enteric methane mitigation strategies and how it benefits the farmer.

Greenhouse gasses

Gasses that capture or trap heat in the atmosphere are called GHGs - they keep the surface of the Earth warm by slowing the rate at which energy escapes to space. This is a natural phenomenon that has been present for millions of years. The release of natural emissions of GHG have always equalled the natural sequestration (process by which carbon dioxide is removed from the atmosphere and held in solid or liquid form) such as when plants take in carbon dioxide (CO\(_2\)) during photosynthesis and release it back into the atmosphere during plant senescence. Why the sudden concern? Due to industrialisation, GHG concentrations exceeded the natural levels in the atmosphere. The atmospheric lifetime of these gasses is at least 50 years and longer. We reached the point where greenhouse gasses are building up beyond the Earth’s threshold to sequestrate them naturally and, therefore, physically creating a hot box effect termed “global warming”.

Naturally occurring GHGs with a direct global warming effect consist of CO\(_2\), methane (CH\(_4\)) and nitrous oxide (N\(_2\)O). Fluorinated gasses (hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride, and nitrogen trifluoride) are synthetic, potent GHGs that are typically emitted in smaller quantities from a variety of industrial processes (IPCC, 2006). There are several other gasses that have an indirect effect on global warming by influencing the formation or destruction of GHGs, however this will not be discussed in detail.

Understanding global warming potential

The effect of a GHG on global warming is dependent on the following:

- Concentration in the atmosphere
- How long it stays in the atmosphere (lifetime)
- Ability to absorb energy (radiative forcing capacity)
Some gases are more effective than others and for each GHG, a Global Warming Potential (GWP) has been calculated to compare apples with apples. A GWP compares the radiative forcing capacity of a tonne of a GHG over a given period of time (e.g., 100 years) to a tonne of CO\textsubscript{2} (IPCC, 2006) – hence CO\textsubscript{2}-equivalent (CO\textsubscript{2}e). Gases with a higher GWP absorb more energy, per tonne, than gases with a lower GWP, and thus contribute more to global warming. Global warming potential provides a collective unit of measure, which allows adding up of emission estimates of different gasses and allowing comparisons across sectors and gasses for example inventory purposes. The latest GWP for CH\textsubscript{4} and N\textsubscript{2}O are available in Table 1. The GWP of CO\textsubscript{2} is exactly 1 (since it is the baseline unit to which all other GHGs are compared) and the atmospheric lifetime of CO\textsubscript{2} is predicted to be very long (still not quantified). Nitrous oxide seems like a far more potent GHG than CH\textsubscript{4}, however the concentration of CH\textsubscript{4} in the atmosphere is 5.6 times more than that of N\textsubscript{2}O making it a fair contender. Furthermore CH\textsubscript{4} is shorter lived in the atmosphere than N\textsubscript{2}O (12.4 vs. 121 years), therefore the mitigation of CH\textsubscript{4} will result in a quicker change.

**Main sources of greenhouse gasses and more specifically methane emissions**

**Carbon dioxide:** enters the atmosphere through burning fossil fuels (coal, natural gas, and oil), solid waste, trees and wood products, and also as a result of certain chemical reactions (e.g., manufacture of cement). Carbon dioxide is removed from the atmosphere (or sequestered) when it is absorbed by plants as part of the biological carbon cycle.

**Nitrous oxide:** is emitted during agricultural (Agricultural soils receiving synthetic fertilisers and organic amendments containing nitrogen contribute a large part to anthropogenic (N\textsubscript{2}O) emissions) and industrial activities, as well as during combustion of fossil fuels and solid waste.

**Methane:** is emitted during the pro-duction and transport of coal, natural gas, and oil. Methane emissions also result from ruminal fermentation (livestock) and other agricultural practices and by the decay of organic waste in landfills. Enteric CH\textsubscript{4} (ruminants) constitute the single most important source of anthropogenic (human-induced) CH\textsubscript{4} emissions, representing 18% of global CH\textsubscript{4} emissions, 31% of human-induced CH\textsubscript{4} emissions and 60% of agricultural CH\textsubscript{4} emissions.

**Table 1:** Global warming potential and atmospheric lifetime of methane and nitrous oxide since 2001. The cells in grey represent the latest values to be used.

<table>
<thead>
<tr>
<th>Greenhouse gas</th>
<th>Lifetime (years)</th>
<th>Global Warming Potential (over a 100 year period)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2001\textsuperscript{1}</td>
<td>2007\textsuperscript{2}</td>
</tr>
<tr>
<td>Methane (CH\textsubscript{4})</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Nitrous oxide (N\textsubscript{2}O)</td>
<td>114</td>
<td>114</td>
</tr>
</tbody>
</table>

\textsuperscript{1}IPCC AR3 (2001)
\textsuperscript{2}Forster \textit{et al}., 2007 (IPCC AR4)
\textsuperscript{3}Myhre \textit{et al}., 2013 (IPCC AR5)
emissions (Figure 1). This emphasises the need for CH$_4$ abatement.

**The cow, methane emissions and the car**

According to Du Toit et al. (2013), the dairy sector in South Africa was responsible for 9.8% (130 giga gram) of the total methane emissions produced from the South African livestock sector in 2010, which is substantial enough to be concerned. Dairy cows fed forage-based diets can produce between 250 and 600 grams of enteric CH$_4$ emissions per day dependent on dry matter intake (Charmley et al., 2016). To put this in perspective, a single dairy cow emits approximately the same amount of CH$_4$ emitted by an average passenger car driving 40 km per day (EPA, 2014). This just emphasises the need for CH$_4$ mitigation strategies in the dairy sector.

**Why the need for a carbon tax**

Because the Earth’s climate may be near tipping point, the need to act is increasingly pressing. Responding quickly with CH$_4$ reductions would lessen the likelihood of irreversibly crossing such tipping points into a new climatic state. Only with the recognition of the urgency of this issue and the political will to commit resources to comprehensively mitigate both CO$_2$ and non-CO$_2$ GHG emissions will meaningful progress be made on climate change. One solution is the implementation of carbon tax. The purpose of a carbon tax, seen too often as a way to increase the tax base, is

**Figure 1:** Global methane emission sources subdivided into natural, agricultural and other anthropogenic (human-induced) sectors (adapted from Knapp et al., 2014).

![Methane Emission Chart](chart.png)

- **Enteric CH$_4$ represents:**
  - 18% of global CH$_4$
  - 31% of anthropogenic CH$_4$
  - 60% of agricultural CH$_4$

- **Anthropogenic 58%**
- **Natural 42%**
- **Agriculture 30%**
- **Other anthropogenic 28%**
intended more to send the necessary price signals to change consumer behaviours and stimulate investor appetite to shift towards low carbon options. The ultimate goal is to develop a carbon tax system that can account for GHG emissions and removal. This is not an easy task to initiate and even more difficult to maintain due to citizen protests, horrendous amount of related administration and quantifying accurate GHG emission estimations within industries. The Australian Government is an example of this - they were one of the first countries to implement carbon tax and one of the first countries to remove their carbon tax. It is understandable that industries that contribute to fossil fuels and landfills should be carbon taxed because they are usually highly profitable and quantifying their CO₂ emissions is fairly accurate. Whereas, additional taxation on the agricultural sector with small profit margins can be devastating.

The proposed South African Carbon Tax
The South African carbon tax policy is scheduled to come into effect on 01 January 2017 as indicated in the draft bill (Strategic Plan 2016-2020. Measurement, Reporting and Verification: AFOLU Sector, Department of Environmental Affairs, Pretoria). Recognising the importance of reducing CO₂e emissions and foreseeing the benefits that a low carbon economy can bring, the South African government has committed to GHG emissions reductions of 34% by 2020 and 42% by 2025 as outlined in the National Climate Change Response Paper (DEA, 2011) and the National Development Plan. In summary, the key points of the design features of the carbon tax include (quoted: Meissner, 2016):

- A basic 60% tax-free threshold during the first phase of the carbon tax, from 2017 to 2020;
- An additional 10% tax-free allowance for process emissions;
- An additional tax-free allowance for trade exposed sectors of up to 10%;
- Recognition for early actions and/or efforts to reduce emissions that beat the industry average in the form of a tax-free allowance of up to 5%;
- A carbon offsets tax-free allowance of 5 to 10%;
- In recognition of the role of carbon budgets, to provide for an additional 5% tax-free allowance for companies participating in phase 1 (2016 - 2020) of the carbon budgeting system.

The following website can be visited for more detail: http://www.thecarbonreport.co.za/the-proposed-south-african-carbon-tax/?gclid=CIr4i9DCtM8CFdU_GwodKaUKLg

The initial marginal carbon tax rate will be R120 per ton of CO₂e. Taking into account the thresholds mentioned above, the effective carbon tax rate is much lower and ranges between R6 and R48 per ton of CO₂e. The combined effect of all of the above tax-free thresholds will be capped at 95%. The carbon tax applies to all the sectors and activities except the agricultural sector (in particular land use and land use change) and waste sectors, which will be exempt during the first implementation phase (up to 2020) due to methodological challenges. There are still several shortcomings in the proposed carbon tax, especially in the agricultural sector, that will need to be addressed (Meissner, 2016).

Conclusion
The topic ‘Climate change’ is globally in the spotlight. The sustainability of natural resources has been brought into question. Carbon tax has been adopted by several countries with the purpose to shift industries toward low carbon options and in return lowering their annual GHG emissions. The South African agricultural carbon tax is scheduled for end of 2020 and farmers
should adopt mitigation strategies in time. Some strategies are already in place such as no or minimum tillage practices and planting of trees and shrubs. The costs associated with mitigation strategies can be seen as tax relief.

References


How to reduce on-farm enteric methane production

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Introduction
Globally, the livestock sector is responsible for approximately 14.5% of all human-induced greenhouse gas (GHG) emissions of which approximately 44% is in the form of methane (CH₄) (Gerber et al., 2013). Methane is a potent GHG with 34 times the greenhouse potential of carbon dioxide (Myhre et al., 2013). It is well known that GHG accumulates in the ozone layer, which brings forth climate changes and global warming. The ripple effect includes the increased risk for drought, fire and floods and climate-sensitive diseases. The sustainability of current farming enterprises has been brought into question. Furthermore, it is scheduled that agricultural carbon tax will be implemented in South Africa by the end of 2020. The aim of this paper is to promote early adoption of methane mitigation strategies by dairy farmers, therefore enhancing dairy cow production efficiency, optimising resources, lowering the on-farm carbon footprint and exempting future agricultural carbon tax.

Understanding the formation of enteric methane gas
Methane gas, in ruminants, is produced mainly from microbial fermentation of hydrolysed dietary carbohydrates (HDC); cellulose, hemi-cellulose, pectin, glucose and starch; in the rumen and emitted primarily by eructation (burping). Rectal emissions account for only 2 to 3% of the total CH₄ emissions in dairy cows (Muñoz et al., 2012). The primary substrates for ruminal methanogenesis (formation of CH₄ – Equation 5 below) are hydrogen and carbon dioxide (CO₂). Most of the hydrogen produced during the fermentation of HDC, much of which is generated during the conversion of sugars to volatile fatty acids, ends up in CH₄ (Bhatta et al., 2007). The multiple-step pathways of this conversion process are summarised in the following equations (Hungate, 1966; Czerkawski, 1986; Moss et al., 2000):

[1]  Glucose → 2 pyruvate + 4H (carbohydrate metabolism);
[2]  Pyruvate + H₂O → acetate + CO₂ + 2H;
[3]  Pyruvate + 4H → propionate + H₂O;
[4]  2 acetate + 4H → butyrate + 2H₂O;

The formation of propionate serves as a hydrogen sink in ruminal fermentation (Equation 3).

Therefore, a greater proportion of propionate and/or a lower acetate:propionate ratio in ruminal fluid could indicate a lower availability of metabolic hydrogen for methanogenesis that forms CH₄. Propionate production can be stimulated by diets containing relative high starch contents. As such, any nutritional intervention that causes a shift in favour of propionate production (or decreasing »
acetate production – Equation 2) will be accompanied by a reduction in methane production per unit of feed fermented (Knapp et al., 2014).

**Why should the dairy industry be concerned about methane emissions?**

It is well known what effect greenhouse gasses (GHG), such as methane emissions, have on climate change and global warming. Nevertheless, why should the dairy industry in any country be concerned about methane emissions?

1. Enteric CH$_4$ (ruminants) constitute the single most important source of human-induced CH$_4$ emissions, representing 18% of global CH$_4$ emissions, 31% of human-induced CH$_4$ emissions and 60% of agricultural CH$_4$ emissions (Knapp et al., 2014).

2. Retailers and consumers in both domestic and international markets show a growing concern about the contribution of GHG emissions to the carbon footprint of foods. We as milk producers do not want to be labelled as an industry doing nothing towards the lowering of GHG. Unfortunately, poorly informed consumers do have the power to plummet sales.

3. Methane gas account for up to a 12% (some say up to 15%) loss in gross energy intake (Johnson & Johnson, 1995). A cow with a high methane output is an inefficient cow, resulting in a system with high inputs and low outputs.

4. Enteric and manure methane comprise more than 40% of the GHG emissions associated with fluid milk production in the United States (Thoma et al., 2013). A comparable value to what we can expect in South Africa.

5. Methane and nitrous oxide is cheaper to mitigate than CO$_2$ (Gerber et al., 2013).

6. Methane mitigation approaches can be economically advantageous as well as environmentally beneficial.

7. Furthermore, lowering on-farm methane emissions could lead to future agricultural carbon tax exemptions.

**Methane mitigation strategies in broad**

Enteric CH$_4$ per unit of energy corrected milk (ECM) (example: g of CH$_4$/kg of ECM) is the preferred unit of measurement for CH$_4$ production for two reasons, 1) dairy farmers will not be willing to implement CH$_4$ mitigation strategies at the cost of milk production and 2) food security is important, agriculture must focus on production efficiency to provide an adequate food supply.

Methane mitigation strategies can be broadly classified into three main categories (adapted from Hristov et al., 2013 and Knapp et al., 2014):

1. **Nutrition, feeds and feeding management (5 – 15% reduction in enteric CH$_4$/ECM emissions)**: high quality feeds can increase animal productivity and feed efficiency. Nutritional mitigation of CH$_4$ production is founded on three basic approaches:
   a. **Ingredient selection** to alter volatile fatty acid patterns – certain feeds can enhance propionate or decrease acetate production (Equations 2 and 3), decreasing hydrogen that would be converted to CH$_4$.
   b. **Increased digestibility and ruminal passage rate (particle size and feed processing)** – increased dry matter intake alter microbial populations and VFA production patterns and shift some digestion to the intestines.
   c. **High quality diets** to increase milk production per cow, which will dilute the CH$_4$ cost.

2. **Feed additives or rumen modifiers** (an overall conservative average of 5%...
reduction in enteric CH₄/ECM emissions, however some feed additives, like nitrate, can reduce enteric CH₄/ECM emissions by up to 50%): feeding additives that directly or indirectly inhibit methanogenesis or using biological control aimed at reducing CH₄ producing organisms. Mitigation strategies in this category can be subdivided into the following:

a. **Inhibitors** - impractical on farm level.

b. **Electron receptors** - recommended mitigation strategy (nitrate reduces CH₄ production by up to 50% with a long-term persistency).

c. **Ionophores** - effect is inconsistent (monensin).

d. **Plant bioactive compounds** - excess compound and/or limiting protein supply results in reduced digestion and production (tannins, saponins, and essential oils).

e. **Exogenous enzymes** - no direct effect on CH₄ production.

f. **Direct-fed microbials** - lacking convincing animal data to support exciting in vitro results (yeast-based products).

g. **Defaunation** - no practical defaunating agents tested comprehensively in vivo.

h. **Manipulation of rumen archaea and bacteria** - vaccines proved unsuccessful needs to be further tested and verified.

i. **Dietary lipids**: vegetable oils - depresses dry matter intake when fed in excess.

j. **Dietary lipids**: by-products - can impair rumen function due to the presence of monounsaturated fatty acids.

3. **Genetics and other management approaches** (9 – 19% reduction in enteric CH₄/ECM emissions): improving nutrient utilisation, increasing feed efficiency and decreasing CH₄ per unit of product (meat or milk). If annual production of milk remains constant, total CH₄ emissions will be decreased and fewer cows are needed to produce the same amount of milk.

Feed additives and feeding management strategies for CH₄ emission mitigation that have been tested are summarised in Table 1 (on next page). Nitrate is the only feed additive that demonstrated sustained methane reduction without compromising milk production in dairy cows (Knapp et al., 2014). The success of nitrate as methane mitigation agent has been emphasised in the literature review. It is also evident that there is a complete lack of dairy grazing studies implementing nitrate supplementation as methane mitigation strategy. The use of nitrate as supplement, however, does come with its own challenges, which can be overcome by following a strict protocol in preventing nitrate poisoning. Care should be taken not to exceed recommended total diet nitrate intake levels and animals should be adapted in 25% increments weekly (four weeks) to avoid toxicity. Nitrate is present in pasture and spikes after nitrogen fertilisation and when plants wilt. As such, grazing animals do have a higher tolerance to nitrate poisoning when compared to animals fed total mixed rations. This emphasises the importance of accounting for the basal diet nitrate levels and not to put animals on pasture before 21 days after nitrogen fertilisation. The maximum daily intake level is 21 g of nitrate/kg of dry matter intake or 0.7 g of nitrate/kg of body weight for pregnant dairy cows.

By combining CH₄ mitigation strategies from each of the main CH₄ mitigation categories may result in an additive effect in the reduction in enteric CH₄/ECM emissions. However, the cost of the strategy and animal health should not be overlooked.
Table 1: Feed additives and feeding management strategies for methane (CH$_4$) emission mitigation (adapted from Hristov et al., 2013)

<table>
<thead>
<tr>
<th>Category</th>
<th>Potential CH$_4$ mitigation effect</th>
<th>Long-term effect established</th>
<th>Effective$^2$</th>
<th>Environmentally safe or safe to the animal</th>
<th>Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhibitors</td>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Bromochloromethane and 2-bromo-ethane sulfonate</td>
<td>High</td>
<td>?</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Chloroform</td>
<td>High</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Cyclodextrin</td>
<td>Low</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>3-nitrooxypropanol</td>
<td>Medium</td>
<td>?</td>
<td>Yes</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Electron receptors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Fumaric and malic acids</td>
<td>No effect to High</td>
<td>?</td>
<td>Yes</td>
<td>No?</td>
<td></td>
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<tr>
<td>Nitroethane</td>
<td>Low</td>
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<td>Yes?</td>
<td>No</td>
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<tr>
<td>Nitrate</td>
<td>High</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes, if fed at safe levels</td>
<td>Yes?</td>
</tr>
<tr>
<td>Ionophores</td>
<td>Low</td>
<td>No?</td>
<td>Yes?</td>
<td>Yes?</td>
<td>Yes?</td>
</tr>
<tr>
<td>Plant bioactive compounds</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tannins (condensed)</td>
<td>Low</td>
<td>No?</td>
<td>Yes</td>
<td>Yes?</td>
<td>Yes?</td>
</tr>
<tr>
<td>Saponins</td>
<td>Low?</td>
<td>No</td>
<td>Yes</td>
<td>No?</td>
<td></td>
</tr>
<tr>
<td>Essential oils</td>
<td>Low?</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Exogenous enzymes</td>
<td>No effect to Low</td>
<td>No</td>
<td>No?</td>
<td>Yes?</td>
<td>No</td>
</tr>
<tr>
<td>Defaunation</td>
<td>Low</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Manipulation of rumen microbes</td>
<td>Low?</td>
<td>No</td>
<td>Yes?</td>
<td>Yes?</td>
<td>Yes?</td>
</tr>
<tr>
<td>Dietary lipids</td>
<td>Medium</td>
<td>No?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes?</td>
</tr>
<tr>
<td>Inclusion of concentrate</td>
<td>Low to Medium</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes?</td>
</tr>
<tr>
<td>Improving forage quality</td>
<td>Low to Medium</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Grazing management</td>
<td>Low</td>
<td>Yes</td>
<td>Yes?</td>
<td>Yes</td>
<td>Yes?</td>
</tr>
<tr>
<td>Feed processing</td>
<td>Low</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Mixed rations and feeding frequency</td>
<td>?</td>
<td>?</td>
<td>Yes</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>Precision feeding and feed analysis</td>
<td>Low to Medium</td>
<td>Yes</td>
<td>Yes?</td>
<td>Yes</td>
<td>Yes?</td>
</tr>
</tbody>
</table>

$^1$High, ≥30% mitigating effect; Medium, 10 to 30% mitigating effect; Low, ≤10% mitigating effect

$^2$ Determined on the basis of CH$_4$ mitigation potential, effect on feed intake (no negative effect is beneficial), and/or effect on animal productivity (no negative effect or improvement is beneficial)

$^3$ ? = uncertainty due to limited research or lack of data, inconsistent or variable results, or lack (or insufficient) data on persistency of the effect
Methane research at Outeniqua Research Farm

In the literature CH$_4$ mitigation studies were exclusively performed on total mixed rations. Little has been done on pasture-based dairy research with the focus on enteric CH$_4$ mitigation. Researchers at Outeniqua gained the capacity to measure CH$_4$ emissions from individual grazing cows without affecting their normal cow behaviour (SF$_6$ tracer gas technique). Methane mitigation strategies implemented at Outeniqua included feeding management (increasing dairy concentrate feeding level) and feeding a feed additive/rumen modifier (nitrate) during late summer (kikuyu pasture) and early spring (ryegrass pasture).

Feeding management methane mitigation strategy – concentrate feeding level:

With the aim to develop a baseline for methane emissions from cows in the temperate coastal area, cows were fed 0, 4 and 8 kg of dairy concentrate/cow per day. The pasture base was predominated by perennial ryegrass. Results indicated that cows fed 8 kg of dairy concentrate tended to produce 30% less CH$_4$/kg of ECM than cows on zero concentrate and 25% less CH$_4$/kg of ECM than cows fed 4 kg of concentrate (Figure 1).

The concentrate feeding mitigation strategy proved to be effective in reducing CH$_4$ production due to the increase in animal efficiency. This strategy is also easy and safe to adopt on farm level. However, the increase in feed cost should be taken into consideration when implementing this strategy. Each dairy farm will have its own concentrate feeding level sweet-spot taking into account the available resources and fodder flow regime. The following preliminary methane prediction model was developed from the study’s results for on-farm use:

$$\text{Methane per ECM (g/kg)} = 67.8 - (0.619 \times \text{milk yield kg/d}) - (16.09 \times \text{milk lactose %}) + (9.58 \times \text{milk protein %})$$

Figure 1: Methane emissions (g/d) and methane production (g/kg of milk yield (MY) and g/kg of energy corrected milk (ECM)) of Jersey cows fed either 0, 4 or 8 kg of dairy concentrate per day grazing perennial ryegrass during early spring.
Energy corrected milk equation for back-calculation of CH$_4$ emissions (g/day):

$$\text{ECM (g/kg)} = \text{ECM} = \text{milk yield kg/d } \times ((0.384 \times \text{milk fat %}) + (0.223 \times \text{milk protein } \%) + (0.199 \times \text{milk lactose } \%) - 0.108) / 3.1$$

By implementing this model on individual cows, cow production efficiency can be obtained. The range for methane production of grazing dairy cows is 12 to 30 g methane/kg ECM. Therefore, cows with a methane value below 21 g will be more efficient than cows with a methane value above 21 g. This is only comparable when cows are on the same diet.

Feed additive/rumen modifier methane mitigation strategy – nitrate supplementation:

The second CH$_4$ mitigation strategy implemented at Outeniqua was the use of nitrate supplementation (non-protein source feed additive) in the form of a slow release calcium nitrate source [5Ca(NO$_3$)$_2$·NH$_4$NO$_3$·10H$_2$O; Bolifor CNF, Yara, Oslo, Norway]. Initially nitrate was included in the dairy concentrate at two different levels, 1.75% and 3.5% dry matter fed to cows grazing kikuyu pasture. The pasture nitrate content in the southern Cape coastal area was estimated to be 0.230.1% (kikuyu – summer) and 0.330.2% (perennial ryegrass – winter/spring). A 400 kg Jersey cow can have a pasture dry matter intake of 10 kg (2.5% of body weight) along with a dairy concentrate dry matter intake of 5.4 kg (6 kg as fed). It was, therefore, calculated that cows on kikuyu pasture fed the 1.75% and 3.5% nitrate containing concentrates had a daily nitrate intake of 19 and 37 g/kg dry matter (or 0.28 and 0.52 g/kg body weight), respectively. The 3.5% nitrate containing concentrate was over the top (>21 g of nitrate/kg of dry matter intake which could be toxic), which fortunately caused a palatability problem – cows refused more than 50% of the concentrate.

Figure 2: Methane emissions responses (g/kg dry matter intake [DMI]) to increasing levels of nitrate (g/kg body weight [BW]) in ruminants (beef cattle, dairy cows, sheep) from eight studies and 25 treatments. Circle indicates our nitrate intake level. (Adapted from Lee and Beauchemin, 2014).
in the dairy parlour. Henceforth, only the 1.75% nitrate containing concentrate was replicated on perennial ryegrass pasture. The calculated daily nitrate intake of cows on ryegrass pasture fed the 1.75% nitrate containing concentrate was 20.6 g/kg dry matter (or 0.31 g/kg body weight).

Methane production results of the studies are still pending. However, the CH\textsubscript{4} production and nitrate intake regression of Lee and Beauchemin (2014) gives a good idea of what to expect in terms of CH\textsubscript{4} production of ruminants (Figure 2). According to Figure 2 (on previous page), we can predict a 20 to 30% reduction in CH\textsubscript{4} production at the 1.75% nitrate containing concentrate fed at 6 kg (as is) per cow per day.

**Conclusion**

Today there are a number of potentially effective CH\textsubscript{4} mitigation strategies available for the dairy sector. Overall, optimising rumen function through feeding a balanced diet adhering to the cow’s requirements (avoiding energy leakages especially when energy is spent on removing nutrients, such as protein, fed in excess rather than animal production), hence enhancing animal efficiency, is the most efficient way of decreasing CH\textsubscript{4} production. Other effective CH\textsubscript{4} mitigation strategies include lipid and dairy concentrate supplementation, feed processing (enhancing the overall efficiency of dietary nutrient), and certain feed additives such as nitrates and tannins. Additives can be toxic to animals when fed in excess. The presence of nitrate in pasture (tannins only in trefoil) emphasises the importance of accounting for the basal diet when including these additives in the dairy concentrate. Farmers should follow a strict adaptation protocol to further avoid toxicity. A reduction of 20 to 30% in CH\textsubscript{4} production can be confidently achieved when increasing the dairy concentrate feeding level or by supplementing nitrate. This can result in exempting the future agricultural carbon tax. AP
References


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