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PULA IMVULA

GROWING FOOD • PEOPLE • PROSPERITY

GRAIN SA MAGAZINE FOR DEVELOPING FARMERS

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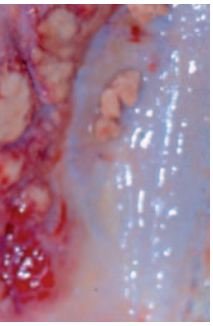

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A Word From...

Sinelizwi Fakade

AS THE SAYING GOES, ITS BETTER LATE THAN NEVER! THAT'S THE EXACT CASE FOR EASTERN CAPE GRAIN FARMERS, AND PERHAPS FARMERS THROUGHOUT THE COUNTRY. FROM A SEASON RATTLED BY POOR RAINS, LATE PLANTING DATES, VOLATILE FUEL PRICES AND POLICY UNCERTAINTY, THE GENERAL OUTLOOK OF THE SEASON HAS DRASTICALLY CHANGED FOR THE BETTER.

Statistically, we have repeatedly analysed the production forecasts for each grain crop planted, and indeed we could've performed better. It must be commended however of the turn-around late rains have done to those forecasts, the picture is definitely brighter.

Harvesting projections have taken a turn for the better, with the maize crop in the Eastern Cape particularly, showing remarkable recovery after a long dry-spell. Farmers within the province and somewhat generally countrywide are breathing a sigh of relief, most notably from yield forecasts. May is a month where yields are estimated more accurately, with summer crops having reached the pinnacle of their development.

Harvesting plans are in full swing and related to that is marketing which according to business experts, is one of the big five when it comes to a successful and sustainable business. May is also the month where Grain SA host arguably the biggest agricultural show in Southern Africa, namely the NAMPO Harvest Day. A show renowned for fun filled activities, insightful exhibitions, good food and what Xhosa speaking enthusiasts describe as '*ixesha elimyoli*', loosely translated as time of good fun and joy.

From a pressured planting season, to worrying crop development we can truly say that May bode well from an expected harvesting perspective and it's a month where farmers can be proud of their effort in difficult and trying circumstances.

Happy Harvesting to all! ■

MARKET your maize harvest

SMALLHOLDERS SHOULD MARKET OR CONSUME THEIR MAIZE HARVEST STRATEGICALLY TO LEVERAGE GREATEST ADVANTAGE. OVER THE PAST FEW SEASONS GRAIN SA TEAM MEMBERS HAVE BEEN ENCOURAGED BY THE PROGRESS OF THE SUBSISTENCE AND SMALLHOLDER FARMERS PARTICIPATING IN THE PROGRAMME.

Jenny Mathews, Pula Imvula contributor. Send an email to jenjonmat@gmail.com

In spite of challenging conditions in some areas, these farmers are improving their agricultural practices and discovering the untapped potential of their fields. The secret lies in doing the right thing at the right time in the right way. We have seen how those farmers who learn from the experience of their mentor – and then actually put the advice into practice – are the ones who improve the fastest.

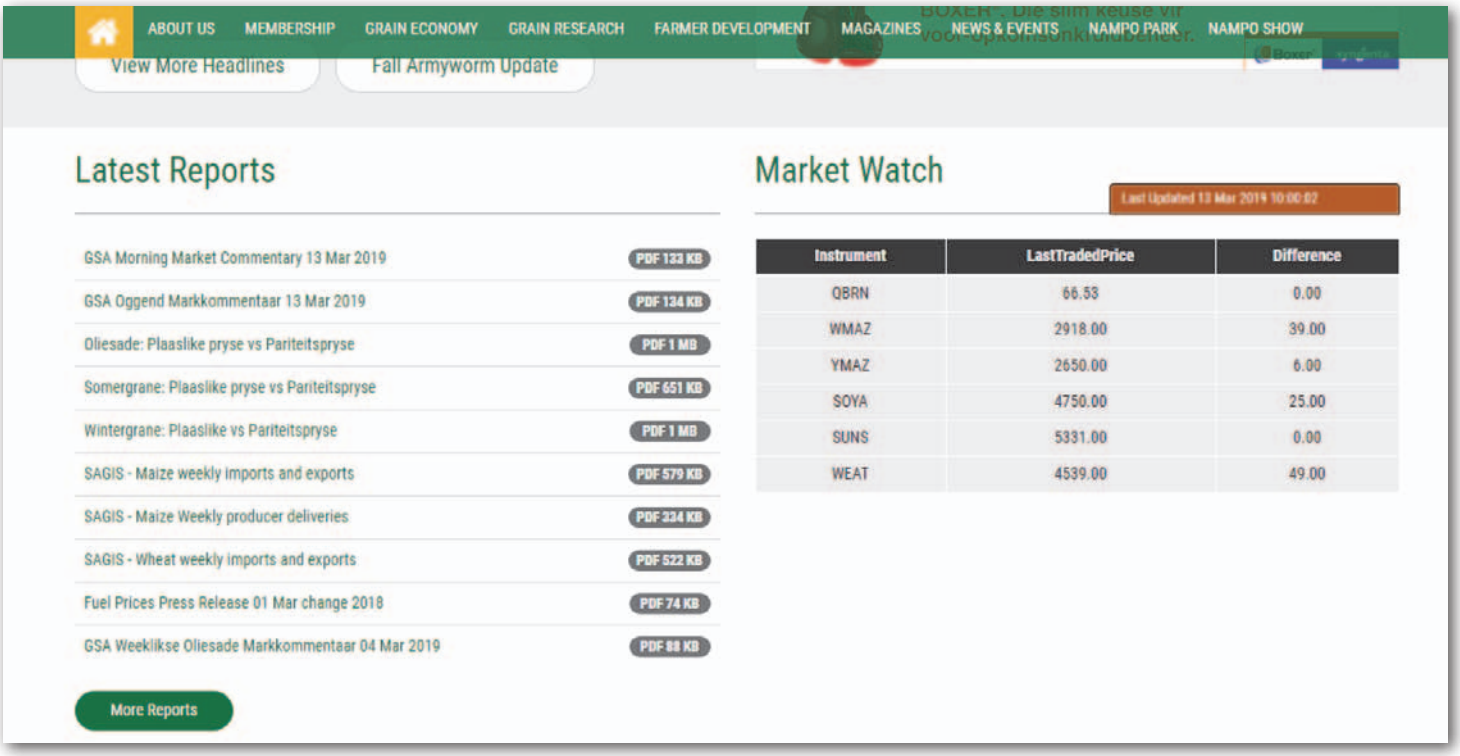
So, with the help of the Grain SA mentors, assistance from programmes such as the Grain SA partnership with the Jobs Fund and with generous support from agribusiness who are committed to successful farmer development and land reform, Grain SA farmer members have seen greatly improved yields. **This has proved to be both wonderful and challenging!**

- It's **wonderful** because heart-warming testimonies of farmers from Mpumalanga, KwaZulu-Natal to the Eastern Cape, tell us how they not only have enough food to give them household food security, but they also have excess grain to feed their livestock and still more to sell. Some farmers have increased the scale of their farming operations because they have grown in knowledge and confidence.
- And it's **challenging** because suddenly farmers have to handle much more grain than ever before. The safe storage of grains has needed more attention and education; mainly due to a lack of knowledge and because of poor infrastructure in deep rural communities. There are few easily accessible silos, roads are terrible, transport is costly and grain processing and milling businesses are far. These challenges can eat into the potential profit of the harvest and need attention.

> *The secret lies in doing the right thing at the right time in the right way.*

MARKETING PLANS SHOULD NEVER BE LEFT TO THE LAST MINUTE

The marketing of field crops in South Africa is based on a free market system. Every farmer is free to choose where and when to sell his crop. He may sell everything immediately or he may choose to store



Visit the Grain SA website,* www.grainsa.com*, to find more information on the current market prices.

the crop and sell it off slowly as he needs funds – or when the price improves.

It is the responsibility of each farmer to negotiate prices for his produce. And farmers decisions must depend on **all the market forces** at play – so every farmer must make work of keeping informed about the market prices and other related expenses. This will best empower him to market his grain strategically.

READ MORE

Here are some links to articles available online:

- September 2017 – *https://www.grainsa.co.za/methods-to-reduce-mycotoxin-exposure*
- August 2017 – *https://www.grainsa.co.za/mycotoxin-impact-on-animal-health*
- June 2017 – *https://www.grainsa.co.za/mycotoxins-and-human-health*
- May 2012 – *https://www.grainsa.co.za/maize-mycotoxin-research-at-the-arc-gci*

> *Some farmers have increased the scale of their farming operations because they have grown in knowledge and confidence.*

CONCLUSION

Even if you are a small-scale farmer, you could save yourself a lot of money if you take time to plan how you will use and market your grain post-harvest. Make sure you have considered all hidden costs and risks, so you are getting the highest possible return on your investment of money and time each season.

WHAT MUST I KNOW WHEN PLANNING TO MARKET MAIZE?

MAIZE HAS A MARKET SPOT PRICE WHICH CHANGES ON A DAILY BASIS

The spot price refers to the current market price on the day on which you wish to buy (or sell) your grain. This information can be found from your local agribusiness/silo manager or even on the home page of Grain SA, *www.grainsa.com*.

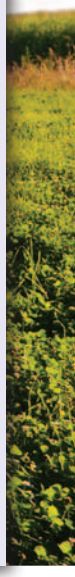
MAIZE PRICE IS INFLUENCED BY MARKET FORCES SUCH AS SUPPLY AND DEMAND

What is the demand for maize in your area like? Could you offload what you have grown locally, or must you transport it some distance and calculate a transport cost? Could you store it yourself and sell it off slowly? Could you consume the crop in your own household and/ or add value to your crop by feeding your own poultry and livestock? Do you need to bag and scale the grain to guarantee better control of your grain crop and make it easier to store and sell?

GRAIN STORAGE COMES AT A PRICE

If you keep the grain, how will you store it? There are both **cost and risk factors** to consider when maize is stored.

- It is important to consider how and where you could store your maize safely so there is no loss or contamination of the grain. Consider the cost of storage. Many local millers and silo facilities will store your grain safely for a daily tariff. Consider this cost against the cost of risk when storing grain, yourself.
- If you choose to store the grain yourself, you have to be certain the storage facility is safe from theft, rodents or insects and moisture.
- Do you know about the risk of contamination from mycotoxins? The consumption of contaminated grain can have serious health effects on humans and livestock including throat cancer in humans, infertility and abortion in animals, and other nervous disorders in livestock. One of the stages at which grain can become contaminated is if it is stored when moisture levels are still too high or if the storage facility is not waterproof and the stored grain gets damp in any way. *Pula Imvula* contributors have written many articles about managing mycotoxins. Key post-harvest points highlighted are:
  - Only harvest your grain when moisture levels are low enough and the crop is fully matured. Grain kernel moisture should be below 14%.
  - Make sure all your implements, vehicles transporting grain and containers storing grain are clean, dry and free of insects, soil and fungal growth.
  - Don't pile the harvest in large heaps which keeps damp or builds heat inside.
  - Sort the grain and remove damaged kernels and any other foreign material.
  - Make sure the storage facility is dry and well ventilated and protected from rain and damp. The store must not be exposed to extreme temperature changes.
  - All storage bags must be cleaned and dry. It is best if you can stack the bags neatly on wooden pallets or poles to aid ventilation.
  - Remember if unsure, you can always take a sample of the grain to your nearest silo and ask them to test moisture levels for you. ■



CROP ESTIMATES – to measure is to know

AS THE PRODUCTION SEASON FOR CASH CROPS PROGRESSES, WHETHER PRODUCED UNDER DRYLAND OR IRRIGATED CONDITIONS, THE PRODUCER IS VERY INTERESTED IN A FINAL YIELD PREDICTION FOR THE VARIOUS CROPS BEING GROWN.

In practice the accuracy improves as the crop growth stage reaches physiological maturity, be it soybeans, sunflowers, maize, wheat or any other cash crop. An accurate estimate as early as possible will allow for some piece of mind as to possible total yield and income, the possibility of hedging for a good price on Safex, communicating the good or bad news to your bankers or partners, increasing your crop insurance, and arranging for the logistics for harvesting, storing and sale of the crop.

The theoretical benchmarks for growth stages in crops can differ quite widely in practice from the planning focused on different crop cultivar characteristics due to the actual heat units, rainfall and climate experienced on your farm.

The crop yield predictions and possible estimate of harvesting for a range of crops planted will assist in your planning for the end of the season. The process will enable you to compare all the crop husbandry benchmarks planned to the actual for this season. All these efforts will help you improve your standards in producing the next crop. The focus of this article will be on the yield determination for maize.

Article submitted by a retired farmer

1 ***Average plant population in the land.***

The size of a ha				
Description	**Length in metres**	**Width in metres**	**Size in square metres**	**Totals**
Cell designation	A	B		
Formula			A x B	
Size of a ha	100	100	10 000	Square metre
Plant population per ha				
Test number	**1**	**2**	**3**	
Plants in ten metres of row	20	15	18	
Row width	0,92			
Rows per 100 metres (one side of a ha)	109			
Plants per 100 metres	200	150	180	
Plants per ha	21 739	16 304	19 565	57 609
Average plants per ha				**19 203**

2 ***Maize – crop yield estimation.***

Determine the mass or weight of seed or kernels per plant									
Test example: Test 1									
Cobs on ten plants	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Totals**
Rows per cob	14	16	14	16	12	14	14	16	
Kernels per row	41	43	38	33	43	34	31	33	
Number of kernels/cob	574	688	532	528	516	476	434	528	4 276
Cobs on ten plants	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	
Rows per cob	14	16	14	16	12	14	14	14	
Kernels per row	28	22	31	33	28	22	34	34	
Number of kernels/cob	392	352	434	528	336	308	476	476	3 302
Cobs on ten plants	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	
Rows per cob	14	16	14	16	12	14	14	14	
Kernels per row	28	22	31	33	28	22	34	34	
Number of kernels/cob	392	352	434	528	336	308	476	476	3 302
Cobs on ten plants	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	
Rows per cob	14	16	14	16	12	14	14	14	
Kernels per row	28	22	31	33	28	22	34	34	
Number of kernels/cob	392	352	434	528	336	308	476	476	3 302
Total number of kernels in all cobs counted									**14 182**

To measure is to know' is a useful slogan when managing key performance areas in crop production.

MAIZE

There are small differences that can be made in calculation methods, but the producer must remember that previous crop experience in making estimates compared to the actual harvested will also help to make the calculations more accurate.

CONCLUSION

'To measure is to know' is a useful slogan when managing key performance areas in crop production. The more often you do crop estimates in a practical scientific way the more you will become more accurate in your crop yield estimates in future production years.

1 DETERMINE THE PLANT POPULATION PER HA

This calculation can be done before planting to establish the yield target for different cultivars and again after planting to see that the final emerged plant population is enough for a crop and for crop yield estimations for crop insurance and at physiological maturity before harvesting.

Count the number of plants per ten metres of row where you are doing the cob counts and kernel mass tests. Calculate the average plant population in the land. Please see the calculations in **Table 1**.

The average plants per hectare determination is used in Step 2 – the average seed mass or weight per plant has been calculated.

2 DETERMINE THE KERNEL OR SEED MASS OR WEIGHT PER COB AND PLANT

2.1 Determine total cobs per ten metres

Count the cobs in a row to obtain an average from three rows of the number of viable cobs per ten metres of row. Measure ten metres with a proper tape measure at random in three different rows or in three rows that are a representation of the main crop displaying visible, properly developed cobs within the land to being estimated for yield.

2.2 Row width

Measure the distance between rows in several places. These are usually 0,92 m or 0,75 meters or planted in tram lines with variable row spacing between the narrow two rows and the outer lines. An average distance between the rows can be calculated.

3 MASS OR WEIGHT OF SEED PER COB AND PLANT

3.1 Count the number of cobs found in ten consecutive plants and remove the covering leaves bound over the seed kernels.
3.2 Count the number of rows on each cob and enter the number into the example in **Table 2**.
3.3 Count the number of seeds in an average row and enter the number in Table 2. (Only count kernels that will contribute to the crop).

Examine Table 2 as an example of the calculations required. Collect the information required to be able to calculate the average mass or weight of the seed kernels per cob and plant.

The number of cobs counted per ten plants could range, in a normal crop, from ten to 30, in exceptional production years. Table 2 as an example, shows a full 32 cobs for Test 1. Three tests per land should be done to obtain a representative yield estimate. Remember, we are calculating the mass of seed per cob and plant but using the mass per plant in the final yield calculation.

4 DETERMINE THE YIELD PER HECTARE OF YOUR MAIZE CROP

Weight or mass per kernel

As can be seen in Table 2 we are assuming a mass per kernel of 0,28 grams. This can range from 0,22 grams to 0,34 grams depending on the rain received, general soil fertility, moisture conditions throughout the growth of the crop, heat waves at pollination and seed set or cold experienced and stress from weed competition, plant diseases and insect damage.

Keep cobs from previous crops and count and measure small, medium and large cob kernel weights as well as total cob weights. With more experience the producer can do a simple crop estimation using total plant population, number of cobs per plant, and estimated average weight per cob and calculate a possible yield scenario at various stages after pollination and tasselling.

3 ***Determine the yield per hectare of your maize crop.***

Determination of yield of maize per hectare

Description	Plants	Kernels/ test	Average kernels/ plant	Mass/kernel grams	Grams/ plant	Plant population/ha	Total grams/ha	Total kgs/ha	Total yield tons/ha
Block letter	A	B	C	D	E	F	G	H	
Formula			B/A		C * D	From plant population test	E * F	G/1 000 grams/kg	H/1 000 kgs/ton
Total Test 1 (above)	10	14 182	1 418	0,28	397				
Total Test 2 (e.g.)	10	10 543	1 054	0,28	295				
Total Test 3 (e.g.)	10	12 100	1 210	0,28	339				
Totals (averages)	**30**	**36 825**	**1 228**	**0,28**	**344**	**19 203**	**6 602 725**	**6 603**	**6,60**
Simulated yields at different kernel mass or seed mass									
At a kernel mass of				**0,21**	258	19 203	4 952 043	4 952	**4,95**
At a kernel mass of				**0,35**	430	19 203	8 253 406	8 253	**8,25**

ARE YOU MAKING PROGRESS?
– Keep track to know

THE AFRIKAANS SAYING GOES: '*OM TE MEET, IS OM TE WEET*'. TO MEASURE IS TO KNOW! THIS IS SO VERY TRUE ESPECIALLY IN THE FARMING WORLD. IN EVERYTHING THERE IS A NORM, AN ABOVE AVERAGE AND A BELOW AVERAGE. ONE OF THE FUNDAMENTAL KEYS TO SUCCESS IS TO KNOW WHERE YOU FIT IN.

Gavin Mathews, Bachelors in environmental management. Send an email to gavmat@gmail.com

Not everybody is a successful farmer; in fact, there are few exceptionally good farmers. The only way that you will achieve true success is to have a benchmark and to have goals. One needs consistent improvement in order to stay in business. To improve you need to be able to track your performance year on year. Let us take a look at strategies that you could employ to do this.

STARTING POINT

Perhaps you have never recorded one piece of data in your farming career. Perhaps you don't enjoy sitting behind a desk and analysing figures. If this is the case, let us consider how to start.

Firstly, you should start by having a very critical stand point. You should expect only the best from yourself in everything that you do.

1 ***A basic example of capturing information.***

Year 2018					
Expenses	Fuel	Maintenance	Labour	Seed	Fertiliser
	R50 000	R25 000	R30 000	R80 000	R65 000
Income	Maize	Sunflowers	Beans	Contracting	
	R100 000	R50 000	R10 000	R5 000	
Yields	Land 1	Land 2	Land 3	Land 4	Land 5
	Maize 4,5 ton	Sunflowers 1,2 ton	Maize 3 tons	Sunflowers 0,5 tons	Beans 0,8 tons

Compare information between lands and seasons – this will help you to make informed decisions.

To get a starting point you could consider recording the figures that you can remember, perhaps last season's data. One wants to record quantitative data only i.e. yields, prices, planting dates, harvesting dates, expenses, incomes etc.

Once you have decided what figures you would like to record and keep track of, you should set up an easy user-friendly method of capturing this information. It should be something that you are comfortable with and something that will stay the same. You could do this on an excel spreadsheet or in written form in a log book. Do whatever suits you the best.

Once you have designed a format that works for you, you can start filling in the data. Be honest and accurate in all aspects. If you try and over state your achievements, you won't be cheating anybody but yourself. Try your best to be thorough. Obviously if you are starting and working from memory then a few mistakes are expected and that is ok, at least the ball will start rolling.

BE CONSISTENT

Today's data is only as good as yesterdays. The reason we record is to improve and if we are not consistent about our recording we will never know if we are. Try and get into a habit about recording information as it comes in. Once you have finished harvesting a land, calculate your average yield on that field by using your weigh slips and record it. When you spend money on maintenance record it. When

you purchase your inputs record your expenses. Try your best not to miss anything as this will alter the accuracy of your data.

USE YOUR DATA

Once you start to develop a database over a few seasons you will be able to use the information to track your performance. In the example of data in **Table 1**, Land 1 had an average maize harvest of 4,5 tons, but Land 3 only achieved a 3-ton yield. Why did this happen? If your next year's data shows Land 3 with a below average yield again, then we need to look carefully into the situation. Perhaps Land 3 is deficient in certain nutrients.

Now you can act on this information and do a soil analysis to try and remedy the problem. If this information was not recorded, you would not have improved. By using the data that you record, you can also make very important budgeting decisions. If for example, you notice that your maintenance expenses increase year on year, then you may need to look at what it is that costs you so much money, perhaps you need to consider purchasing a new piece of equipment. These are just a few examples of using the data to make informed decisions to improve your business.

CONSIDER THE CLIMATE

Agriculture is hinged to nature and the environment. This is one aspect of our business that we have no control over. But we can still record climatic conditions to better understand our other data. Make a point of recording things like rainfall and extreme weather events i.e. floods, drought, hail, early frost.

Monitor your progress by keeping rainfall records.

If your yield results are low and your rainfall records were low in the same year, then you can better understand the correlation. Another advantage of recording the weather is that we can learn to have a better understanding of the weather, and in some instances even make rough predictions of what the weather may do in the future.

If we remain stagnant and never improve then the chances of success are slim. By keeping records, we are building a historic map to help us make decisions in the seasons ahead. ■

Old silos for grain storage.

Looking back and ahead at the maize price

AS THE 2018/2019 SEASON DRAWS TO A CLOSE, IT HAS BEEN A BUMPY RIDE FOR FARMERS DUE TO MANY FACTORS, WITH DROUGHT PLAYING A MAJOR ROLE, WHICH LEFT MOST OF THE WESTERN AREAS PLANTING LATE OR NOT PLANTING AT ALL.

Ikageng Maluleke,
Junior Economist, Grain SA.
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The question on everyone's mind is whether there will be enough maize stocks to meet the demand for both domestic and export consumption. South Africa consumes an average of 10,5 million tons of maize per year, with average yields of about 5 t/ha.

As indicated on **Table 1**, maize production for 2016/2017 and 2017/2018 totalled 9,9 million tons, and 16,8 million tons respectively. According to the Crop Estimates Committee (CEC), maize production is estimated to be 12,5 million tons for the 2018/2019 season, while it is forecasted to be 10,51 million tons for the 2019/2020 season.

Looking at production in 2018/2019 South Africa had higher ending stocks due to surplus production in prior seasons, which prompted farmers to move from maize production to alternative crops. Meanwhile, due to dry conditions for the 2019/2020 season, farmers planted late, some did not manage to plant, while others opted for sunflowers, as it has a longer planting window.

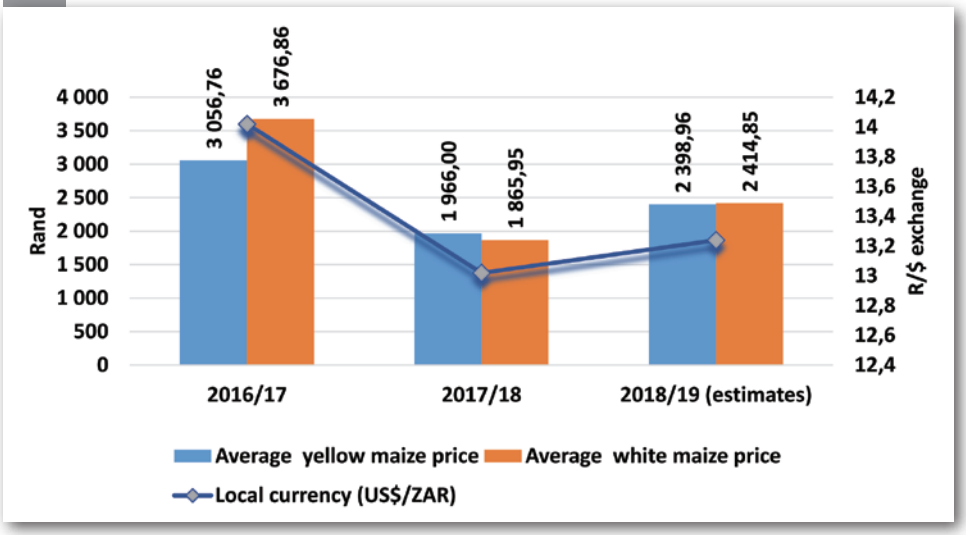
Production and ending stocks for 2019/2020 are projected to be lower than the previous year by about 16% and 32% respectively, while exports are expected to decrease by roughly 57%. However, consumption is expected to increase to almost 11 million tons, meaning the country will have just about enough for consumption.

The size of production is affected by weather conditions, which affects the area planted and eventually the price of the crop. However, there are other factors that affect maize prices; this includes availability of information and the volatile rand/dollar exchange rate. If the rand is weak, prices are supported higher and if the rand is strong, this creates pressure on maize prices as seen in **Graph 1**.

Reflecting on the two seasons prior to 2018/2019; in 2016/2017 local maize prices were trading at export parity levels of about R3 056/ton due to a shortage of maize in the market. For the better part of the 2017/2018, local maize prices traded at export parity level of R1 966/ton, mainly due to a surplus for that period.

For 2018/2019, maize prices have been trading between import and export parity with an average of R2 300/ton, however closer to export parity. Looking into the 2019/2020 season, taking into consideration, current production forecasts, anticipated ending stocks and volatility of the rand, prices are expected to move closer to import parity, which could be at 2016/2017 levels.

1 ***Maize prices and Rand/dollar exchange rate.***



1 ***Supply and demand of maize.***

Supply and demand	2016/2017	2017/2018	2018/2019 (Estimates)	2019/2020** (Forecast)
Production (tons)	9 955 000	16 820 000	12 510 000	10 510 000
Average consumption per year	10 101 000	10 599 000	10 964 000	10 837 000
Ending stocks (tons)	1 095 000	3 689 000	2 728 000	1 851 000
Exports (tons)	1 026 000	2 482 000	2 278 000	980 000

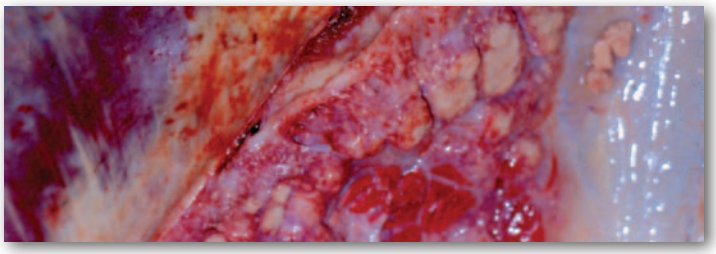
**Figures as at 6 March 2019*
Source: Grain SA, 2019

Animal diseases that affect humans

Zoonotic tuberculosis

CONTAMINATED COW'S MILK AND UNPASTEURISED DAIRY PRODUCTS WITH *MYCOBACTERIUM BOVIS* BACTERIA ARE THE MAIN SOURCE OF INFECTION CAUSING BOVINE TUBERCULOSIS IN HUMANS. BUFFALO MILK CONTAMINATED WITH THE BACTERIA CAN ALSO BE A SOURCE OF INFECTION TO HUMANS.

Jan du Preez, veterinary specialist, Public Health. First published in SA Graan/Grain June 2018. Send an email to drjanh.dupreez@gmail.com



Tuberculosis lesions in the thoracic cavity of a buffalo.

Bovine tuberculosis is a direct anthropozoonosis (disease or infection that occurs primarily in animals and is transmitted naturally to humans) and is caused by the bacterium *M. bovis*, which occurs mainly in cattle, but also in game (particularly in buffaloes) and carnivorous animals.

The disease has been passed on to game (such as buffaloes, eland and bushbuck) and other animals like baboons, kudu and impala. The infection could be transmitted to other types of stock and game that live in close contact with infected cattle, and to predators that eat infected prey.

These bacteria cause a relatively small percentage (less than 2%) of tuberculosis cases in humans. Most cases of tuberculosis (more than 90%) in humans are caused by *Mycobacterium tuberculosis* (human tuberculosis). *Mycobacterium bovis* tuberculosis in humans has reduced drastically over the years due to effective disease control in cattle and the pasteurisation of cow's milk.

Tuberculosis occurring in humans can infect animals. Millions of new *M. tuberculosis* infections are reported across the world every year. This disease is one of the most important infectious diseases causing the death of humans worldwide. It is estimated that more than 1,6 million people globally died of tuberculosis in 2016, with 374 000 deaths having been people who were human immunodeficiency virus (HIV) positive. Of these 374 000 deaths, 180 000 were in South Africa.

Tuberculosis can be prevented and controlled in people. The disease is a leading infection among HIV-positive people. Because tuberculosis can be transmitted reciprocally between humans and animals, it is known as an amphizoonosis. During 2016 there were an estimated 10,4 million new tuberculosis infections worldwide, of which about 1 million were infections in children.

OTHER NAMES

Other names by which tuberculosis in humans is known are *phthisis* (Greek), *consumption* (Latin), *scrofula*, *Pott's disease* and *white plague*.

HOW HUMANS BECOME INFECTED

Not everyone who is infected with *M. Bovis* or *M. tuberculosis* becomes sick. Persons who are infected but not sick, have a hidden or invisible tuberculosis infection. These infected persons do not feel sick, have no symptoms of the disease and cannot spread the tuberculosis to other persons.

There are certain persons with latent tuberculosis who can become sick, however. About one third (2,47 billion) of the world's population (7,5 billion) has latent tuberculosis, with the great majority being infected with *M. tuberculosis*.

Most persons are infected with *M. bovis* by drinking infected unpasteurised milk or eating infected processed dairy products. The bacteria can infect humans through direct contact with tuberculosis lesions during post mortem examinations on cattle or other animals (like buffaloes, kudu, lions and many others), with the bacteria penetrating the body through cuts and wounds.

Inhaling bacteria from infected air exhaled by an animal can infect humans. Direct infection from animals to people through the inhalation of infected air (droplet infection) is rare. Transmission of *M. Bovis* bacteria from human to human can occur through the inhalation of droplets when an infected person coughs or sneezes.

TUBERCULOSIS: OCCUPATIONAL DISEASE

Persons who are exposed to the disease through their job are animal handlers, abattoir and butchery employees, vets, as well as persons working on dairy farms, game farms, feedlots and beef cattle farms. Persons consuming raw milk and unpasteurised processed dairy products fall into a high-risk category of people who can contract an *M. bovis* infection. People who are infected with HIV have a 20 to 30 times greater risk of contracting tuberculosis than people who do not have HIV.

Persons who run a high risk of contracting *M. bovis* tuberculosis should undergo regular screenings tests for tuberculosis. Lung radiography is used to diagnose tuberculosis in humans. Screening tests for animals include tuberculin skin tests and blood tests.

SIGNS OF THE DISEASE IN HUMANS

Not all *M. bovis* infections in humans cause tuberculosis, and usually people do not have any symptoms of the disease. Persons with tuberculosis due to *M. bovis* or *M. tuberculosis* have a fever, cough, and suffer from night sweats and weight loss.

Other signs of the disease can occur, depending on the organs and body parts affected. If the lungs are affected, the person usually coughs, and if the intestines are affected, the person could have diarrhoea or abdominal pain.

TREATMENT

Tuberculosis in humans caused by *M. bovis* is usually treated in the same way as *M. tuberculosis* infections. In humans the disease is usually treated with combinations of different antibiotics. Without treatment, the disease can be fatal.

PREVENTION AND CONTROL OF *M. BOVIS* IN HUMANS

Use only pasteurised milk, or milk that has undergone another effective heat treatment, and use only such milk to manufacture dairy products. Avoid contact with cattle, game and other animals that have tuberculosis. Tuberculosis is a government-controlled animal disease in South Africa in terms of the Animal Diseases Act (Act 35 of 1984). ■

EMERGING MYCOTOXINS
– should we be concerned?

MYCOTOXINS ARE NATURALLY OCCURRING, SECONDARY METABOLITES PRODUCED BY VARIOUS FUNGI (THE MOST PROMINENT BEING *FUSARIUM* AND *ASPERGILLUS* SPP). MYCOTOXIGENIC FUNGI CAN INFECT A WIDE RANGE OF CROPS AND PRODUCE MYCOTOXINS PRE- AND POST-HARVEST.

Contaminated grain can be a major health risk to humans and animals. Essentially, all of the agriculturally important fungal toxins were first recognised as animal diseases, and often there was a long journey before their significance in humans was adequately understood.

Furthermore, analytical methods for mycotoxin quantification was limited. Presently, it is relatively easy to identify and quantify the principal mycotoxins that affect food and feed. To ensure food and feed safety, many countries have established regulatory limits for mycotoxins. However, these regulations only cover some of the known mycotoxins such as aflatoxins, fumonisins, ochratoxin A, deoxynivalenol and zearalenone.

EMERGING MYCOTOXINS

Emerging mycotoxins are a group of chemically diverse mycotoxins. Despite increasing research efforts, toxicological data is scarce and therefore no regulations exist for these mycotoxins. Emerging mycotoxins can co-occur with each other and with the principal mycotoxins mentioned above.

1

A maize ear infected with a* Fusarium *spp.

Dr Belinda Janse van Rensburg, ARC-Grain Crops, Potchefstroom.
First published in SA Graan/ Grain May 2018. Send an email to BelindaJ@arc.agric.za

Few studies regarding the synergistic effects of co-occurring mycotoxins are available. This highlights the importance of continued research of emerging mycotoxins. The most relevant and frequently occurring emerging mycotoxins in grains that will be discussed in this article are Fusarium toxins. Fusarium emerging mycotoxins include enniatins, beauvericin, moniliformin, and fusaproliferin.

> *We have shown that in the 2016 - 2017 season, the emerging mycotoxins moniliformin and beauvericin was not a threat in the production of safe maize grain.*

EMERGING MYCOTOXINS – A SOUTH AFRICAN STUDY

In South Africa, the second most occurring fungal pathogen on maize ears is *Fusarium subglutinans* (**Photo 1**). Prior to 2011, research and publications reported that fumonisins, moniliformin, fusaric acid, fusaproliferin and beauvericin were produced by *F. subglutinans*.

In 2011, the *F. subglutinans* strain that produced beauvericin was renamed as *F. temperatum*. These fungi cannot be morphologically differentiated, but they can be differentiated by means of sequencing (differences in DNA patterns is analysed).

The aim of our study was to determine the distribution from different climatic zones and mycotoxigenic potential of *F. subglutinans* and *F. temperatum* in subsistence and commercial maize producing areas of South Africa. To achieve this, we studied a total of 180 *Fusarium subglutinans* strains (stored at the ARC-Grain Crops at -70°C) previously collected (2007 - 2009) from maize grain from commercial and subsistence farmers' fields from eight provinces in South Africa.

To determine the occurrence of mycotoxigenic *Fusarium* spp. in South African maize fields, eleven different maize cultivars were collected from five provinces (eight localities) in the main maize production areas of South Africa (2016 - 2017). *Fusarium* spp. were isolated from these grain samples and identified.

RESULTS

Of the 180 Fusarium strains (stored at -70°C), 46 strains were identified as *F. subglutinans* and 134 strains as *F. temperatum*.

Subsistence farmers (2006 - 2009)

From the 101 strains collected from subsistence farmers, *F. temperatum* was more predominant in the Eastern Cape and Mpumalanga when compared to *F. subglutinans*. In the Limpopo province no *F. temperatum* was detected and in KwaZulu-Natal an equal amount of both species were detected.

Commercial producers (2006 - 2009)

F. temperatum was more predominant in the Free State compared to *F. subglutinans*. The ratio of *F. temperatum* and *F. subglutinans* was more balanced in Gauteng, Mpumalanga, North West Province and KwaZulu-Natal.

Mycotoxin producing ability of the strains

Fungal strains were sent to Italy for mycotoxin quantification and neither *F. temperatum* nor *F. subglutinans* produced fumonisins. *F. temperatum* produced beauvericin in eight isolates ranging from 0,3 µg/g to 9,6 µg/g.

Both *F. temperatum* and *F. subglutinans* produced moniliformin in some of the isolates ranging from 35 µg/g to 9 296 µg/kg.

Mycotoxigenic Fusarium spp. from grain collected at producers' fields

The isolate frequency of *Fusarium* spp. from maize grain collected during 2016 to 2017 showed that *F. verticillioides* was present in all localities with the highest frequencies at Coligny (79%), Potchefstroom (95%), Tweebuffelsfontein (98%), Wesselsbron (79%) and Vaalharts (56%).

F. temperatum frequencies were 93% in Cedara and 31% in Bethlehem. Low *F. temperatum* frequency levels were recorded in Vaalharts (3%), Coligny (7%), Potchefstroom (0,41%), Wesselsbron (0,01%), Petit (5%) and Tweebuffelsfontein (0,01%). *F. subglutinans* had low frequency levels, except in Vaalharts (36%).

Moniliformin was not detected in any of the grain samples. Fumonisin B1 was detected in all the grain samples, ranging from 13 µg/kg to 3 356 µg/kg. Beauvericin was present in grain samples from Bethlehem, Tweebuffelsfontein and Wesselsbron (550 µg/kg, 986 µg/kg and 447 µg/kg respectively).

DISCUSSION

Most strains that were previously morphologically identified as *F. subglutinans* were in fact *F. temperatum*. It is evident that *F. verticillioides* is still the prevalent fungi infecting maize grain in producers' fields, especially in warmer maize producing areas. *F. temperatum* was more predominant in cooler, moist (misty) areas. The *F. subglutinans* isolate frequencies of 36% at Vaalharts (warm area) in the 2016 to 2017 season, is a production constraint.

45% of the *F. temperatum* and *F. subglutinans* strains (2006 - 2009) produced moniliformin (35 µg/kg - 9296 µg/kg) in vitro, no fumonisins were produced and 11% of the *F. temperatum* strains produced beauvericin (0,3 µg/kg - 9,6 µg/kg).

It is important to note that these strains can produce these mycotoxins in field grain if a susceptible host and favourable environmental conditions exist. Fumonisin B1 was present in all the grain samples (2016 - 2017) and beauvericin was present in two samples in the Free State and one sample in North West Province.

To ensure food and feed safety, many countries have established regulatory limits for mycotoxins.

VALUE OF THIS RESEARCH TO THE INDUSTRY

From this study we have identified which strains of *F. temperatum* is low or high moniliformin and beauvericin producers. We have identified the *F. subglutinans* strains with low or high moniliformin producers. These strains are maintained at -70°C and can be used in future studies (health, regulations, co-occurrence with other mycotoxins).

We have shown that in the 2016 - 2017 season, the emerging mycotoxins moniliformin and beauvericin was not a threat in the production of safe maize grain. Although the principal mycotoxin (fumonisin) was present in all the samples, levels were below 4 000 µg/kg.

The South African regulated tolerated level is 4 000 µg/kg for raw maize grain, intended for further processing. ■

WORDS OF WISDOM

None of us, including me, ever do great things. But we can all do small things, with great love, and together we can do something wonderful.

~ MOTHER TERESA

Profit maximising feeding period for cattle

THE CATTLE FEEDLOT SECTOR PLAYS A SIGNIFICANT ROLE IN THE RED MEAT INDUSTRY. APPROXIMATELY 70% TO 80% OF CATTLE THAT REACH THE CONSUMER WENT THROUGH A FEEDLOT FEEDING PHASE TO ENSURE A MARKET ACCEPTABLE CARCASS.

Philip Oosthuizen, Head: Economics and Research, Sernick Group. First published in SA Graan/ Grain June 2018. Send an email to Phillip@Sernickgroup.co.za

Intensive feeding of cattle in feedlots is crucial due to insufficient land and pastures to raise weaners for the market. Furthermore, the rate and efficiency to feed weaners for the market by utilising grain are higher and can be done in less time, hence the preference for this system. Feed is one of the major input costs in a feedlot and has a great influence on feedlot profitability and therefore sustainability.

Feedlot profitability is risky and unstable due to various factors such as input and output prices, which are market driven and determined by supply and demand. Production factors which include growth, feed conversion and carcass characteristics are determined by genetics, products, climate and management, among others.

Variation in price and production factors have a great influence on profit margins. The occasional 'cost squeeze effect', where the profit margin decreases due to increasing input costs and stable or decreasing output prices, places even more pressure on profit margins – hence the importance of and focus on the effective and productive use of resources and management.

A solution for the above is precision agriculture, which can be defined in a simple two step definition: Firstly, identify the genetic or natural potential of the animal. After the capped potential has been determined, change and adopt the products and processes to utilise the genetic or natural potential optimally.

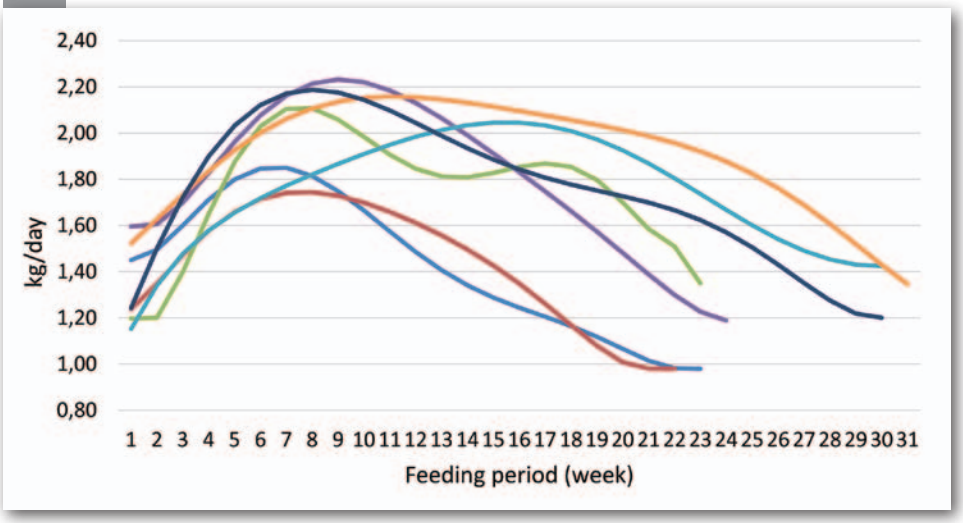
RESULTS

The Sernick Precision Feedlotting project of 2015 is a practical example of precision agriculture in the feedlot. Feedlots generally treat all beef breeds in a homogeneous programme with a standard feeding period. The objective of this study was to determine the profit maximising feeding period for different breeds, consequently the differentiation between beef breeds. Firstly, referring to the definition of precision agriculture, the unique genetic growth and feed intake curves were determined for each breed through a feedlot experiment. **Graph 1** indicates the average daily gain curves for the seven different breeds.

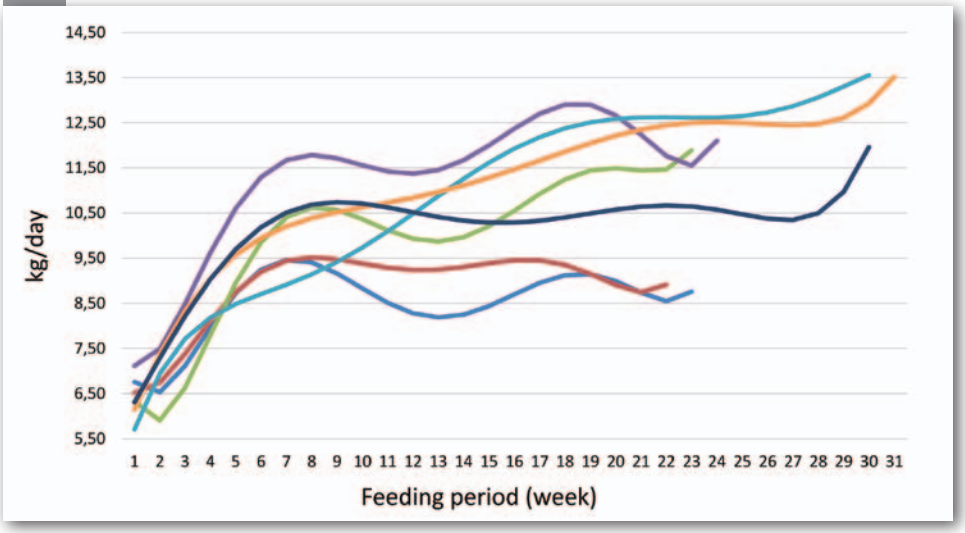
It is evident that the initial growth slopes, peak average daily gain and finishing growth slopes differ significantly. Feed intake and feed conversion for the seven breeds are indicated in **Graph 2** and **Graph 3**. Big differences are evident, therefore there is an opportunity to differentiate between the breeds.

Input and output prices, which are feed and carcass prices, were incorporated into a model with the growth and feed intake data. A produc-

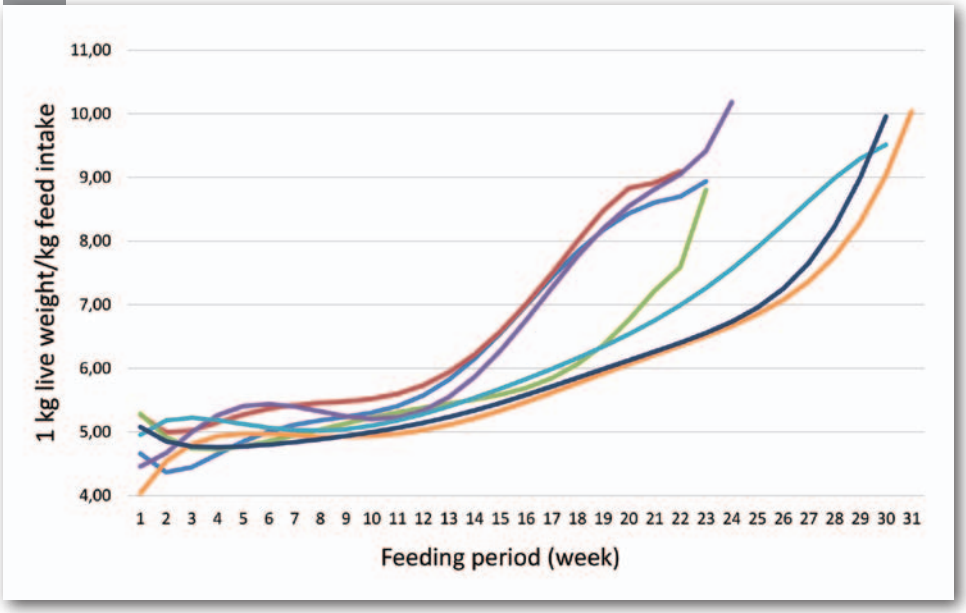
1 ***The average daily gain curves for different beef breeds.***



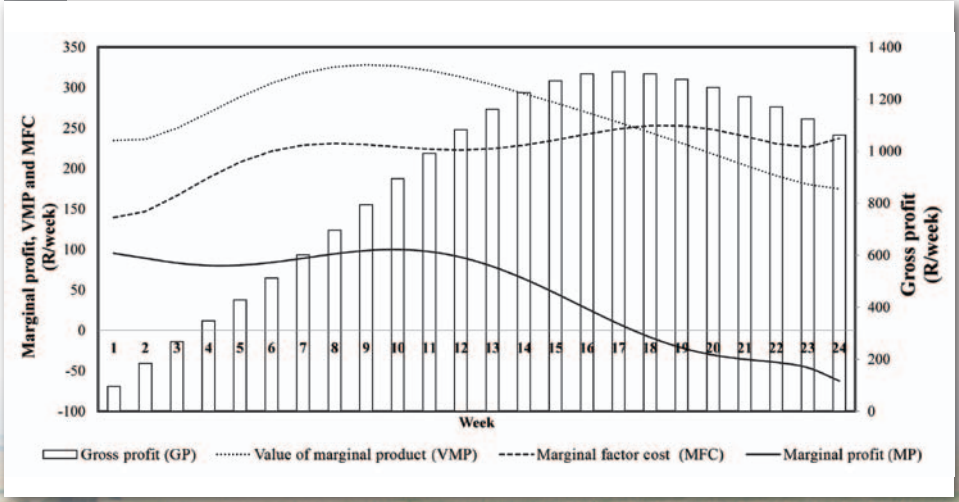
2 ***Feed intake for different beef breeds.***



3 *Feed conversion for different beef breeds.*



4 *Graphic representation of the profit maximising feeding period.*



tion economic theory was used to calculate the profit maximising feeding period. This theory simply states that maximum profit will be realised when the marginal additional value of the product equals the marginal cost, which refers to the value of the weight gained by the animal and the value of the feed that it was fed.

The results indicated significant differences between the profit maximising feeding period for the different breeds in the specific price scenario of 2015. Brahman, Afrikaner and Bonsmara had a profit maximising feeding period of 112, 105 and 112 days respectively. A profit maximising feeding period of 147 and 154 days was calculated for Simbra and Angus.

An unexpected long profit maximising feeding period of 189 and 182 days was determined for Simmentaler and Limousin. The average standard feeding period in most South African feedlots is 133 days. Consequently Brahman, Afrikaner and Bonsmara must be fed shorter than the average, were Simbra and Angus have to be fed longer and Simmentaler and Limousin even longer. **Graph 4** shows the profit maximising feeding period model result.

CONCLUSION

Referring to the definition of precision agriculture, an additional 6% in gross profit can be realised by using the profit maximising feeding period model. This can have a significant influence on feedlot profitability. The genetic potential of each breed was determined and used in combination with variable market prices to determine the profit maximising feeding period. For this reason, management in terms of slaughter criteria must be changed where the profit maximising feeding period model is concerned considered.

This way an animal's genetic potential will be utilised optimally, the price variation risk will be addressed and decreased, and resources and feed will be utilised optimally to produce beef. ■

Take the MARKET as a whole into account

IN THE PREVIOUS SECTIONS OF THIS BRIEF SERIES, WHICH WAS PUBLISHED OVER THE PAST FOUR MONTHS (FEBRUARY TO MAY), THE FOCUS MAINLY FELL ON POST-HARVEST MARKETING, WHICH INCLUDED THE BACKGROUND TO POST-HARVEST MARKETING, FACTORS TO BE KEPT IN MIND WHEN THIS IS CONSIDERED, THE DIFFERENT ALTERNATIVES THAT CAN BE CONSIDERED, AND ALSO PRACTICAL EXAMPLES TO UNDERSTAND THE CALCULATIONS INVOLVED.

This section highlights the factors to be kept in mind when post-harvest marketing is done.

Luan van der Walt, Agricultural Economist, Grain SA. First published in SA Graan/Grain June 2018. Send an email to luan@grainsa.co.za

BACKGROUND

The volatility of South African grain prices is, among other things, one of the biggest challenges that confront local grain producers and that can have a significant impact on the profitability. This volatility is the main reason why grain marketing and hedging are vital. You should therefore make sure what the various alternatives are that are available for these purposes.

The marketing and/or hedging of grain can be mainly divided into two principal categories, namely pre-season hedging and post-season or post-harvest marketing.

Pre-season marketing or hedging refers to when certain positions in the market are taken as protection against unfavourable price movements in order to manage price risk.

Post-harvest marketing refers to the marketing of grain when it has already been harvested. The storage of grain with a view to selling it later is surely one of the best-known post-harvest strategies that is employed. Other strategies that can be employed specifically for these purposes are also available and include the use of derivative instruments on the Safex market.

If for whatever reason there are not sufficient pre-season hedgings in place and the challenge of low grain prices appears when it is time to harvest, post-harvest marketing plays a critical role in the profitability of the farm. It is important to be cognisant of the different marketing alternatives that can be considered and employed in order to benefit if the market trades more favourably during the course of the season. These alternatives can contribute to a higher price and better profitability.

WHAT IS THE AIM OF ALL THIS?

One of the main aspects to be kept in mind in post-harvest marketing is that ultimate aim. When the aim of a post-harvest marketing strategy is known, you will be in a more favourable position and can make the right decisions about the strategies you want to follow.

The main aim is therefore to achieve a better price for the grain produced. This can be accomplished through various alternatives, ranging from the physical storing of grain to the use of derivative instruments on the Safex market.

Keep in mind that risk management is still vital when these strategies are implemented, and although production risk is considerably lower with post-harvest marketing because there is already an indication of how many tons are available to be sold, the highest possible price with the least possible risk associated with it should still be the objective.

Producers also have to familiarise themselves with the risks involved with the use of the various strategies. They should also make sure that they know what the underlying factors are to be noted when they make these decisions.

FACTORS TO BE NOTED

There are a range of factors to be noted when post-harvest marketing strategies are considered and used. This wide variety of factors ranges from the underlying factors that should largely determine the movement of the market price in the course of the season, up to

Grain SA/Sasol photo competition – Jan Schoonraad 2017.

and including the impact that the different strategies can have on the business.

Some of the main aspects to be noted are discussed below.

Price and risk management

In general, under normal conditions grain prices are at their lowest during the harvest when grain is delivered. Alternative strategies should therefore be followed to achieve a better price.

As the aim of marketing is to manage prices without incurring major risks, you should ensure that the risks associated with the strategy are taken into account and are then considered together with the factors that will drive the market price in the course of the season. This will ensure that the best possible strategy is selected, as the different strategies will offer different outcomes under different circumstances.

Costs associated with the strategy

Cash flow is one of the most important aspects of any business – and also of any farm. Cash-flow positions should be protected as far as possible and you should determine what impact the strategy that is followed can have on the cash flow of the farm.

When grain is stored to be sold later, there is virtually no cash inflow during the harvest. This only realises later when the grain is sold. Take the costs associated with storage into account. Costs include physical storage costs, as well as the opportunity costs and interest on production capital that are not yet being settled.

Other strategies can offer the opportunity to ensure a cash inflow during the harvest, and also possibly to make a profit in the course of the season. Producers should make sure of the aspects associated with these strategies.

Marketing plans with realistic objectives that will contribute towards facilitating decision-making and that to a large extent remove the emotion around the decision could make them winning plans.

Be familiar with the price levels

It is essential to be familiar with production costs, as well as the amount of profit that is envisaged for the season. When you are very familiar with the cost structures of your farm, it will be easier to plan when it comes to the strategy.

When the costs associated with the strategy are calculated, you can determine what the minimum price should be to make sure that the strategy is profitable. While the strategy is assessed, the necessary and relevant market information should be considered at the same time.

The familiarity with the cost structures of the farm will greatly contribute to more objective decision-making, because better decisions can be made if the market were to trade at certain price levels.

Keep the strategies as simple as possible

Although a large variety of strategies can be considered and a large number of alternatives can be used in combination with each other, it is important to keep the strategy that is used as simple as possible.

Particularly complicated strategies can require in-depth knowledge of the markets and the technical aspects of their operation in order to really understand how they work. There are good, simple strategies that can be used successfully – a few of them have already been discussed.

The strategy that is considered must also be discussed thoroughly with the grain trader to ensure that everybody understands what the aim of the strategy is and what the possible profit or loss associated with the strategy can be.

IN CONCLUSION

Something to be kept in mind when decisions regarding specific marketing strategies are made, is that the risk associated with the strategy being used is of vital importance.

The first consideration for a marketing strategy should be to achieve a better price for the product produced – with the lowest risk possible associated with it. Producers should take the market situation as a whole into account and place particular emphasis on the relevant fundamental factors that determine market prices.

Good marketing plans are also extremely important. Marketing plans with realistic objectives that will contribute towards facilitating decision-making and that to a large extent remove the emotion around the decision could make them winning plans. ■

MAKING AGRICULTURE MORE SUSTAINABLE

EVERY SEASON, FOR EVERY FIELD, FARMERS HAVE TO MAKE MORE THAN 40 KEY DECISIONS – ALL OF WHICH CAN MAKE OR BREAK A HARVEST. MANY OF THESE DECISIONS RELATE TO CROP PROTECTION, BECAUSE AT EVERY STAGE OF THE GROWING SEASON, SEEDS AND PLANTS ARE AT RISK FROM WEEDS, INSECTS AND DISEASE.

Magda du Toit, Corporate Engagement and Communications Manager SA, Bayer. Send an email to magda.dutoit@bayer.com

Farmers have a variety of tools, that they may use to assist them on-farm and these include state-of-the-art seed treatments, herbicides, insecticides, fungicides, cultivation practices, hybrid choice, bio-technologies, advanced data analytics, and many more precision technologies. While these tools are individually powerful, used together, they can enhance farm productivity.

As a company, our approach is to keep innovating, but always with the ultimate goal of making agriculture more sustainable. This means that crop protection options available to farmers today, are more sustainable than at any point in history previously.

GLYPHOSATE

The herbicide glyphosate has been instrumental in enabling farmers to protect yields and boost food security. To be able to grow enough food for all of us, farmers need to protect their crops from weeds and agrochemicals like glyphosate offers one way for farmers to fulfill their objective – to produce food.

Glyphosate is one of the most widely used – pre-plant to enable conservation agriculture and post-emergence of maize, cotton and soya containing the Roundup Ready technology – and thoroughly evaluated herbicides in the world and has a long and proven history of over 40 years of safe use. Extensive scientific evaluation of glyphosate spanning over the 40 years by respected international agencies have concluded that glyphosate poses no risk to human health or the environment when used according to label instructions.

Over the years, many scientists have conducted studies and field research with glyphosate based herbicides and published their results in peer-reviewed scientific journals – more than 880 scientific studies are available. The overwhelming consensus is that glyphosate, when used properly according to the recommendations, poses no adverse effects to people, wildlife or the environment.

Glyphosate inhibits an enzyme that is essential to plant growth. This enzyme is not found in humans or other animals, contributing to the low risk to human health. Comprehensive toxicological studies in animals have demonstrated that glyphosate does not cause cancer, birth defects, DNA damage, nervous system effects, immune system effects, endocrine disruption or reproductive problems. The U.S. EPA and German Federal Institute for Risk Assessment, which also recently reviewed glyphosate, have concluded that glyphosate is not carcinogenic.

A US Health Study, which involved tracking 44 932 glyphosate applicators from 1990s through 2013, concluded that there was no association between glyphosate and cancer. 'In this large prospective cohort study, no association was apparent between glyphosate and any solid tumours or lymphoid malignancies overall, including NHL and its subtypes'. J.Natl Cancer Inst. 2018: 110(5): djx233.

CONCLUSION

In South Africa the regulatory system is rigorous, accountable and has ensured robust management of the sector over years.

Product safety and stewardship are important for us. All of our herbicides, including glyphosate, are rigorously tested and then reviewed by third-party scientists at government agencies. All substances and finished products undergo extensive evaluation and testing in the interest of product safety. We assess possible health and environmental risks along the entire value chain and use these to derive appropriate measures to mitigate risks. This means that our products satisfy the highest quality standards and are safe for people, animals and the environment when properly used according to label recommendations. ■

THE CORNER POST

VIEWPOINT

JAN PRETORIUS

When it comes to farming, make time count

IF THERE IS ONE THING THAT NORTHWEST MENTOR, JAN PRETORIUS, STRONGLY BELIEVES IN WHEN IT COMES TO FARMING, IT IS TIME AWARENESS. 'WITH FARMING, YOU CANNOT WAIT UNTIL YOU THINK IT IS TIME, IT IS ABOUT DOING THE RIGHT THING AT THE RIGHT TIME.' TO HIM PLANNING AHEAD IS KEY AND ONE OF THE MOST IMPORTANT LESSONS HE HAS TRIED TO CONVEY AS A MENTOR IS TIME AWARENESS.

Louise Kunz, Pula Imvula contributor. Send an email to louise@infoworks.biz

PART OF THE FAMILY

Jan has been farming on Klipdrift in the Sannieshof region for the past 40 years. He cultivates maize and sunflower in a rotation system and also has a beef cattle component. His son, Jan George (who is also on the Grain SA Executive), joined the farming operation five years ago. Having his son on the farm has made it possible for Jan to spend more time investing in his mentees.

Jan has been a member of Grain SA for many years and feels privileged to have been part of the Grain SA Farmer Development Programme since its inception. 'I was part of a fire fighting committee eight years ago and we helped to extinguish a fire on a Tswana-speaking fellow farmer's farm. 'To see that commercial farmers were prepared to help, changed the perception of the Tswana-speaking farmers in the area and probably paved the way for the mentorship programme.'

He initially had five mentees – three in the Sannieshof and two in the Delareyville areas. 'These farmers all have the same passion as commercial farmers. They want to farm like we do and most of them knew how to plant maize but needed guidance about the finer details of certain agricultural practices.

Currently Du Toit van der Westhuizen handles the study groups in this area and Jan is only involved in one farming enterprise, Dwaalkraal Co-operative. Dwaalkraal Co-operative has seven members who all worked for the farm owner of this farm and gained experience from him. The farm was bought for them by the DRDLR in 2011.

Although they were hesitant about group farming at first, they are now very positive about it and a wonderful example of what can be achieved if people work together and make use of good advice. They plant maize and sunflowers in a crop rotation and also have a livestock component. In planting season, he visits them daily and thereafter twice weekly or when needed. 'If they need any advice or are uncertain of what to do, I am ready to assist them.'

TACKLING CHALLENGES

'The first two years were quite a challenge. In the first year we had money to purchase implements and seed and then came the drought. Not one of the farmers had a harvest.' It was difficult to keep them motivated, but if one has a passion for farming you have to learn sooner or later what the reality of agriculture is. 'In the second year we were in the privileged position to have money in the bank. We could thoroughly prepare the soil and had a good harvest in comparison to farmers who did not prepare in time and once again had no harvest.' Jan says this helped him prove how important time awareness and timeous preparation is. 'Without time awareness and moisture conversation you cannot farm successfully.'

The three areas on which Jan focused to improve their farming skills are:

- Taking the time to do a **soil analysis**, as knowing the nutrient make-up of the soils will enable farmers to make an accurate assessment of what fertilisation programme is required. It may also help realise a higher yield.
- In our area **moisture conservation** is of the utmost importance as groundwater is decreasing. Conserving moisture remains vitally important for crop production and it also ensures a reduction of soil degradation.
- Developing a sense of time awareness or time management was a big challenge. Like the weather, time can't really be managed as no-one can stop the clock. If you miss the planting date, the season could be a disaster. Planning ahead will avoid unnecessary problems like input suppliers running out of stock.

Jan says farming is filled with challenges, but for his mentees – apart from the financial difficulties – the biggest stumbling blocks have been nature (the weather) and choosing the right planting date. 'Insufficient implements also cause a delay, so I have had to help them with my own equipment when time is limited.'

Another one of their big challenges are that neighbouring farmers in the adjacent township are not prepared to have their cattle tested for Brucellosis. Because of this their herd recently declined from 64 to only nine.

PRIDE AND JOY

Being a mentor has made a huge impact on Jan's life. 'To see that the advice I give makes a difference not just to the farmers, but to the whole family, is wonderful. Their children have been able to get a better education as there is more money available.'

One of the highlights that stands out in Jan's memory is when Dwaalkraal Co-operative harvested sunflower for the first time and realised a higher average yield than their mentor. 'They beamed and were so pleased with their effort.' Another was when they were chosen as finalists in the Smallholder Farmer of the Year category in 2014. 'They were very proud of this achievement and still can't believe they were beaten by a female farmer.' (Lungelwa Kama won that year.) Who knows, we might still see them as winners in the future. ■

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