

A black and white cow with a red nose stands in a field of tall grass. The cow is looking directly at the camera. The background is a clear blue sky.

LOGIX

**LOGIX
NEWS**

2020:1

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SA Stud Book and Secretariat Services:

Lockdown Measures due to containment of COVID-19

Due to the measures imposed by the State President, under the Disaster Management Act (Act 57 of 2002), SA Stud Book and the Secretariat must adjust to enable us to continue services despite the lockdown from midnight, Thursday 26 March 2020.

The immediate measures involve equipping our staff, especially those in key positions, to enable them to work from their homes through internet connections. The Stud Book telephone system will also relay calls to the relevant staff member's mobile phone where the correct extension is used when the call is made. For the list of extensions, please consult Stud Book's Facebook page (www.facebook.com/SASTudbook) or Stud Book's web site (<http://www.sastudbook.co.za>).

Stud Book has also put measures in place to ensure that the computer system and connections are always functional. In most cases no, or very little disruptions will be experienced but I would like to urge everyone to be patient where some services are negatively affected by the lockdown. The Logix web interface and functionalities will be fully operational as usual.

All these measures practically mean that the Stud Book Building and Pretoria office will be inaccessible.

Due to the lockdown measures, certain actions can, unfortunately, not take place. Travelling and customer engagements by employees for normal business can therefore not take place. This will therefore affect farm visits by the Technical Advisors and other staff.

Specific adaptations are as follows:

Beef cattle growth tests

In cases where beef cattle growth tests are in progress and supposed to be concluded during the lock-down period, a Stud Book staff member will not be able to verify weights nor record body measurements as is usually done. It is advised that farmers get in touch with the Technical Advisor to assist them. The options suggested are either to extend the test to allow for completion at a later stage or to finish the test as was originally planned but to allow the breeder to record the weights (and other measurements if he/she is able

to), submit them to the Technical Advisor for calculations and submission to Logix of the results.

Logix Milk

The Stud Book service provider (Mérieux NutriSciences) is an accredited laboratory for testing food safety and is therefore exempt from the lockdown measures. Stud Book staff will, however, not be allowed to distribute sample vials and collect samples. Where Mérieux and their couriers conduct this service, it will go ahead. Please also contact your Technical Advisor to advise on the options.

Printed documents

Due to the restrictions printed documents cannot be produced nor dispatched. Users are therefore encouraged to make use of electronic documents, where needed, and print them locally as the need arises.

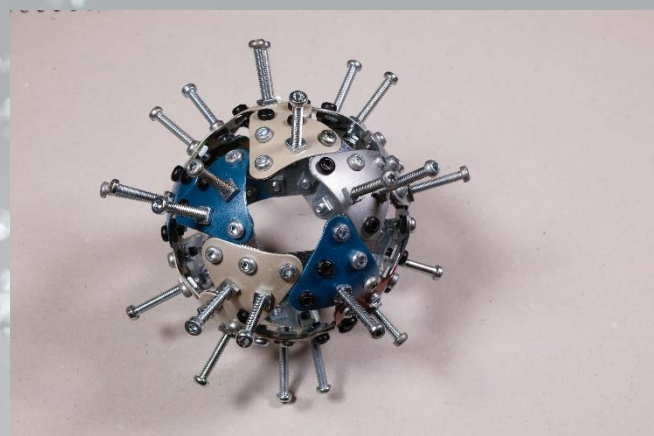
Stud Book's Executive Council (EXCO), Stemma Animalia's Board of Directors, The Management and Staff would like to pledge our commitment to render the service and products in the best of our abilities while the COVID-19 curbing measures are being enforced.

Please feel free to contact me at japie@studbook.co.za, should there be a need for more clarity.

Kind regards,

Dr Japie van der Westhuizen

GENERAL MANAGER





The Ayrshire herd of Jan Wessels outside Napier: The New Normal during lockdown.

News from the Regions: The New Normal

It is hard to keep up with the news about the COVID-19, every day, any hour, things can change, and it is definitely changing our daily routines. Now it is time to figure out our new normal.

Luckily for us, the animal production-cycle remains the same. We can go about and record our data as always. The Logix online systems allow you to upload your records as the event (birth- production- death) happens, therefore use this time to make sure your data is up to date.

The dairy farmers in the Western Cape would be pleased to hear that Mérieux lab will still be collecting your milk samples throughout this lock down period.

With restrictions not allowing people to drive between cities, the beef farmers who are currently busy with on-farm growth test and require RTU scanning, will unfortunately have to postpone this process until after the lock-down. Arrangements can be made individually with farmers otherwise.

My encouragement during this time would be to use our available technology to its fullest potential. Connect with me via WhatsApp, video call or voice notes. Together we will figure out our new normal.

Warm and safe regards,

Chanelle Steenekamp



Hereford cattle of more than one owner participating in a growth test at Harley van Rhyn in the Western Cape. This is one of the growth tests affected by lockdown.

Message from Thalia

South Africa and the world are going through a very difficult time at present and the future seems bleak. This is nothing new for the farmers, just another challenge.

I have so much admiration for you as farmers. The challenge is there every day but you have the courage, make plans and think out of the box all the time. In the worst of times I have seen the farmers make the biggest plans, because tomorrow everything is going better. I believe in this period we can all learn something from you:

Social distancing is nothing new

Believe that tomorrow will improve everything

Focus on today and the tasks at hand

Keep praying

Use available technology at your disposal

Thank you for continuing to provide food in our country and that also of the highest quality. Thank you for being prepared to analyze your milk samples and use your figures to the fullest.

May your animals' rations not change too much, may your courage stay high and your family, farm and workers stay healthy! Please remember, we are here to assist you where necessary.

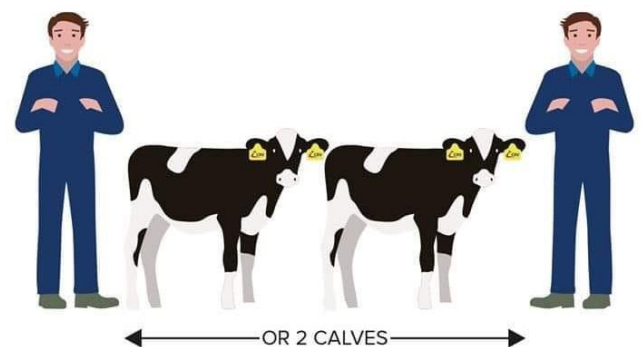
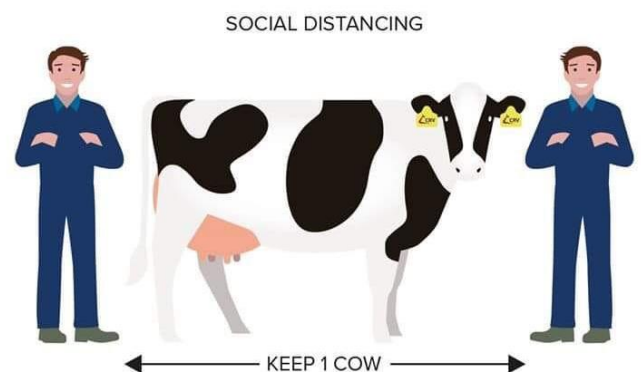
STERKTE!

"The secret to change is to focus all of your energy, not on fighting the old, but on building the new"

Socrates

Lets fight this together!!

Thalia Brameld



Suretha Frances (left) and Thalia Brameld (right) with Pete Durham (top) and Neels Neethling (bottom) at the deLaval Information day.

Messages from our farmers

Poena van Niekerk: ("2020 - Make it count")

Die Wêreld is toegesluit!!!! Suid-Afrika is toegesluit. Mense mag nie uit hulle huise uitgaan nie. Dis 'n begrip wat ek as plaasseun en natuurmens nie kan klein kry nie. Ek mag nie uit my erf uit gaan nie, hulle gaan my toesluit of 'n boete gee!! MAAR – en hier is die ligpunt – ons moet kos maak vir die mense (My President het gesê die boere moet die volk voed – ek was trots om te kan sê Mnr Ramaphosa is my President), ons moet 3 maal per dag ons koeie melk. Ons moet die koeie en verse kos gee. Ons het Kuilvoer gemaak die dag toe die land toegesluit is. Uitdagend op jou emosies, uitdagend op jou visie, uitdagend op jou verhouding met ander mense.

Drie uur Vrydag oggend, 27 Maart 2020, staan ek op en maak reg om my werksmense te gaan oplaai. EK het geen idee gehad (niemand het nie) van wat die dag gaan oplewer nie. En daar staan al my mense en wag vir my, Fannie en Simon en Good Enough en Dorcas en haar melkspan. Ek kyk die WA Statusse en daar sien ek dat my MUT Studente het hulle permitte as essensiële werkers op hulle status geplaas, met trots. Hulle gaan kos maak dat die wêreld kan eet. Hierdie tyd is moeilik en dit in 'n baie moeilike ekonomiese klimaat vir alle melkboere. Daar was beloftes van melkprys verhogings? Daar was beloftes van 'n meer gunstiger melkprys tot voerprys verhouding. Wat nou? Die rand is besig om te bly verswak, teen rekord lae vlakke. Gaan daar te veel melk wees? Gaan die mense geld hê om kos te koop? As hulle moet bespaar, wat gaan hulle nie koop nie? Wat van ons noodsaaklike bronne gaan ons kan invoer en wat nie? AAN AL HIERDIE GOED KAN ONS NIKS DOEN NIE. Ons gaan ons siek redeneer en bekommer oor goed wat ons niks kan doen nie.

WAT KAN ONS DOEN?

Geniet jou koeie!!!! Geniet jou werk en sorg dat jy dankbaar bly vir die voorreg wat God ons gegee het om met sy skepping te kan werk. Die voorreg wat ons Hemelse Vader ons gegee het en ons daarmee vertrou om te sorg dat die mense kan eet. Gistermiddag ry en Comien deur al die buite beeste en ons geniet dit. Want hier is Frieda se Skyfall vers (haar lanklaas gesien want ons bekommer ons mos). Hier het ek die geleentheid om vir my Boerkind dogter te verduidelik die verwantskap tussen die bulle wat ek gebruik. Modesto is Jedi se ma se volbroer en Jedi se ma, Supersire Miri, was op haar dag die beste koei in die wêreld. Ons waardeer saam 'n baie mooi Jedi dogter en ons gaan kyk op die rekenaar wie is haar ma.

MENSE GENIET ELKE DAG. Elke dag is 'n gawe wat God ons gegee het om te kan leef en te kan werk. God sal vir ons sorg, Hy het nog altyd vir ons gesorg – dis maar net ons kleingelowiges wat partykeer twyfel aan Sy goedheid en getrouheid.

Peter Durham sê altyd "Fokus op die geleenthede binne die storm". Gaan vandag en gaan kyk wat se geleenthede hierdie storm vir jou as melkboer bring.

EN ONTHOU!!! Ons het 'n Groot God wat aan ons kant is.

LEKKER MELK!!!



COVID-19 Lockdown Day 7/8

2020-04-02 / 03



Messages from our farmers

Farmers must count their blessings. Here are some of them : - 1. Isolation - it's a way of life we choose and enjoy regardless of what's going on out there 2. Our business carries on while others are forced to stop 3. Our staff carries on working with the knowledge that we do important work 4. We are not confined to our homes but can and must get around 5. We work with wonderful animals 6. We can stop and appreciate the beauty that surround us on the farms 7. Our isolation diminishes the risk of contracting diseases 8. A renewed appreciation is showing for our role in society

Peter Ward, Mooi River

Hi. It's all about focusing on the opportunities and not the chaos.

There will always be opportunities and this lockdown is long enough for people to change habits. Food will get more focus in future and the consumer will become more aware of focusing disposable income on food rather than luxuries.

Peter Durham, Dundee

Stay positive and focused and expend your energy on the things you can control.

Mike Black Boston

Vir die eerste keer gaan almal besef wat die boere werklik vir hulle beteken. Ons kom in die kollig. Kom ons wees dit waardig. Ons is die ruggraat van ons land. Ons gee mos om vir almal en alles rondom ons.

Dr Kobus Hendriks, Heilbron

Pessimis is die enigste mis waarop niks groei nie.

We need to put our faith in God creator of Heaven and Earth.

He could have prevented this virus. In this situation we realize how small man is.

Danny Engelbrecht, Mooi Rivier

In Prediker 3:14 sê die Bybel wat God doen blywend is. Jy kan daar niks van wegneem of byvoeg nie. God doen dit sodat die mens vir Hom ontsag sal hê.

Ongeag van watter posisie jy vandag in die boerdery bekleed, ons is almal in dieselfde bootjie. Al wat ons weet is dat die situasie tans onseker is en dat dit enige oomblik kan verbeter of versleg. Dit pas ons in die omstandighede om uit te reik na iets wat voorspelbaar, standvastig en betroubaar is. Die Bybel sê in Rom.15:4 dat alles wat in die Skrif opgeteken is daar is om ons te leer SODAT ons deur die standvastigheid en bemoediging wat die Skrif ons gee vol HOOP kan wees. Net n paar voorbeelde. Jes. 30:15, Ons krag lê in stil wees en vertrou hê.

Moses voor die Rooisee. Eks 14:14 (Afr 53) Josua 10:14 Koning Josafat 2 Kron 20:17 (Lees asb die hele hoofstuk dit is kosbaar). My gebed is dat as al die stof gaan lê het en alles weer normaal is elkeen van ons sal kan getuig dat Rom.8:28 vir ons werklikheid geword het.

"Ons weet dat God alles ten goede laat meewerk vir die wat Hom liefhet, dié wat volgens Sy besluit geroep is."

Johan van der Merwe, Comondale

Moenie deur vrees gedryf word nie, God is groter as vrees! Bestraf onmiddelik die vrees in Jesus Christus Naam! En wees vry! God sal ons nooit verlaat nie! Trek elke dag 'n bloedlyn van beskerming om jou en jou geliefdes in die naam van Jesus Christus, Dan is jy veilig en het NIKS om oor te vrees nie!

Salette Roux, Middelburg

Northern Region

Generally, most areas had good rainfall and the pastures look very nice for the winter ahead.

Buffland Bull Testing Centre was reopened for animal growth tests from March 2020, after the foot-and-mouth ban on auctions and gathering of animals was suspended. Auctions have also started again after a few months of downtime.

We planned to offer three training courses in Pretoria. However, these are postponed due to COVID-19.

- Beef Production Recording and Logix course. This is a new course.
- Beef cattle breeding (English)
- Beef Breeding (Afrikaans)

Breeders will receive invitations to the courses when they proceed.

Andries Riekert

Free State Region

Fortunately, late rains in large parts of the province have significantly improved the prospects of cheaper rations, resulting in producers being more optimistic. Most of the Free State had good rainfall, with fields and crops generally appearing to be in good shape.

Rampie de Wet



Thalia: We see better results when cows can lift their heads in a natural way.

Courses

We have planned many courses for 2020 but have had to postpone most of them due to the COVID-19 outbreak. We will keep you posted!



The small stock BLUP course was held during March in the Cape. Herman's quote for the course was: 'Stud Book's recording is based on animal events', while Bernice's motto was: 'Breeders should not place animals in their own contemporary groups, rather include all the animals.'



Breeders and Cows

Are there any similarities that can be struck between productive cows and productive owners?
Schalk Greyling analyses a few situations to see if the above statement may be true.

High-producing dairy cows are constantly under pressure. They should take in as much feed as possible in the shortest possible time to produce as much milk as possible. Anything that hinders them to achieve this goal will make them less productive. Highly successful farmers are constantly making major decisions, which can positively or negatively affect the business's productivity.

Approximately 600mm of feeding space is usually required for cows under total mixed ration conditions. Unfortunately, circumstances sometimes dictate that only as little as 450mm per cow is allowed. What are the consequences? Every time a feed cart comes along, the strongest cows eat first and if the feed is not pushed back for the other to reach, the rest do not get a chance to eat. The result is that the younger cows come under pressure and thus their negative energy balance is longer, and they do not become pregnant. So, they become unproductive cows. The same happens with large pasture herds where strip grazing is applied. The weaker cows are at the back and are knee-deep in manure. They are increasingly under pressure and the vicious cycle continues.

What happens when owners are inundated with information, paperwork and all kinds of advertising? The workplace is full of books, papers, advertisements and accounts. A wealth of information is available but causes clutter and an unhealthy environment to make important decisions. The alternative to this is selected information and weekly action lists that enable informed decisions. The result: a breeder who stays ahead and has useful information that has already been processed. He is then able to make productive decisions. This can be compared to a cow that has a short negative energy balance.

Not enough sleeping crates in housing systems also put pressure on cows. They are in production and have used a lot of energy and cannot lie down or must lie in manure. In grazing herds, useless access roads will also lead to unnecessary energy use and potential leg and feet problems. Where the energy supply is already under

pressure, more energy is now wasted, which in turn puts the cows' immune systems under pressure, with a resultant increase in the Somatic Cell Count (SCC).

If the owner wants to do everything himself, he runs around from dawn to dusk in order to get everything done. It often gets out of control in such a way that things become chaotic. Poor planning wastes a lot of time and energy. Experts can provide information that facilitates decision making and thought processes. Actions become simplified, which saves time and energy. This would give the owner more rest and result in correct decisions.

To ensure a good follow-up lactation, the highly productive cow must have a good rest or dry period. During the dry period, the cow gets a chance to recover, get her condition to the right level, and thus starts the next lactation with enough energy. So, the next lactation is a productive one. If the owner also gets a good break somewhere in the year, where his stress levels can drop and he can rest, he will also be able to tackle the following year with additional energy and plans. Therefore, if he receives useful information from milk recording, such as a rest period can be planned peacefully, with action lists that can help to keep the farm going during the rest period.

It is therefore clear that there should be a good agreement between productive and successful cows and productive and successful owners. Make the right decisions to measure production and get cows that love you!





Somatic Cell Count: A Useful Milk Quality Indicator

Schalk Greyling

Somatic Cell Count (SCC) is a very useful indicator of milk quality, as well as udder health and other conditions. Under normal circumstances, approximately 20% of the SCC are epithelial cells derived from the milk alveoli in the udder, while the other 80% are leukocytes, or white blood cells, which are the soldiers that fight infection. A sudden increase in these cells indicates inflammation in the udder or any other part of the body.

Dairy farmers are financially rewarded for herds with low SCC and penalized for high cell counts because cell counts reflect the quality of the milk produced. Milk contracts often define SCC 'thresholds' and an incentive bonus for attaining them.

Milk quality concerning SCC is quantified as the number of somatic cells per millilitre of milk. Therefore, a lower SCC usually indicates a healthier cow, because somatic cells can then only originate from inside the udder. SCC monitoring is important because as the number of somatic cells increases, milk yield is likely to fall, primarily due to the damage to milk-producing tissue in the udder caused by mastitis pathogens and the toxins they produce, particularly when epithelial cells are lost. However, it is important to note that it could also be caused when inflammation occurs in another part of the body, for example uterine inflammation or foot rot.

A particularly low SCC is sometimes regarded as a sign of poor immune response, but in general terms this need not be necessarily true; it may be the case that there is simply a low level of current infection. An immune response is best measured by how quickly the immune system reacts to the disease challenge, thus how fast the white blood cells and the SCC increases.

TABLE 1: Quality change in milk, milk loss and possible infections with SCC change.

SCC Levels	<100 K	100-200 K	200-500 K	500-800 K	800-1500 K	>1500 K
Milk Quality	Excellent	Good	Needs Attention	Poor	Serious	Very serious
% Loss of milk	<2 %	2-4 %	4-8 %	8-10 %	10-35 %	>35 %
% Quarter Infections	<1 %	1-6 %	6-16 %	16-26 %	24-48%	>48 %

When the bulk tank's SCC rises to a level where milk quality adversely affects the farmer's income, it is essential to identify the cows that make the largest individual contribution in the bulk tank's SCC. A common rule of thumb for most of the herds is that 5% of the cows make a 50% contribution to the SCC in the tank.

In production recording, the percentage contribution of each cow's SCC to the herd average, as well as the potential improvement if an affected cow's milk is not included to the bulk tank, is calculated. This list is sent to the participants as a checklist (Figure 1). It is therefore possible to identify single cows with major problems, isolate them and keep their milk out of the tank, thus managing the milk price in order to receive the bonus price and avoid penalization.

Figure 1: Example of a Logix SCC health report

NID	Lactation	DIM	Last Milk	SCC	Cells in Tank	% Contributed by this Cow	Cummulative % Contribution	Cummulative % Animals
Z067	4	238	29.5	9999	294971	4.24	4.24	0.18
C144	2	224	25.8	9999	257974	3.71	7.96	0.36
N137	1	349	27.1	8810	238751	3.44	11.39	0.54
R 32	7	316	21.4	9999	213979	3.08	14.47	0.73
G104	1	146	19.2	9999	191981	2.76	17.23	0.91
C147	3	149	33	5327	175791	2.53	19.76	1.09
N273	1	174	25.7	6837	175711	2.53	22.29	1.27
F012	2	11	32	4613	147616	2.12	24.42	1.45
C135	2	222	43.8	2695	118041	1.7	26.11	1.63
Z046	4	136	34	3340	113560	1.63	27.75	1.81
Z055	3	646	16.5	6052	99858	1.44	29.19	2
Y031	5	316	34.9	2846	99325	1.43	30.62	2.18
F046	2	83	34.1	2894	98685	1.42	32.04	2.36
B109	3	232	32.4	2898	93895	1.35	33.39	2.54
N246	1	339	23.4	3842	89903	1.29	34.68	2.72
N105	2	23	38.9	2289	89042	1.28	35.96	2.9
N263	1	137	35	2455	85925	1.24	37.2	3.09
N390	1	21	30.3	2683	81295	1.17	38.37	3.27
F002	2	297	46.6	1734	80804	1.16	39.53	3.45
N253	1	134	35.1	2278	79958	1.15	40.68	3.63
C101	3	187	33.3	2355	78422	1.13	41.81	3.81
N295	1	115	31.1	2453	76288	1.1	42.91	3.99
B002	3	242	32.4	2329	75460	1.09	43.99	4.17
X052	5	472	19	3911	74309	1.07	45.06	4.36
N188	1	339	23.8	3102	73828	1.06	46.12	4.54
G001	1	229	34.9	2054	71685	1.03	47.16	4.72
B019	3	234	30.7	2243	68860	0.99	48.15	4.9
Z010	4	46	34.9	1812	63239	0.91	49.06	5.08
G037	1	146	38.7	1606	62152	0.89	49.95	5.26
C015	3	203	38.5	1557	59945	0.86	50.81	5.44

Possible reasons for a high SCC

- A cow may show a high SCC early in lactation while the uterus is still recovering after the calving process. Under normal circumstances, it should be completed within 14 days.
- When cows are under nutritional stress, especially in early lactation during the negative energy phase, they may use body reserves. This will put the immune system under pressure, which can lead to a moderate rise in the SCC.
- Infections such as mastitis, foot rot, and other conditions can also lead to serious increases in SCC of individual animals. It should always be kept in mind that the infections do not always have to originate in the udder to result in high SCC levels in milk.
- Older cows' SCC usually increases as the udder tissue degenerates after many lactations.
- Cows in a late stage of lactation or that have been in lactation for a very long time also have higher SCCs.
- Milking machines that do not function optimally can also cause a large increase in the average SCC in the herd.
 - If pulsation of the milk machine is not correct, it can cause the milk/rest phase of the machine not to have the required rest phase and thus constantly create a vacuum at the teat end.

- If the teat vacuum is too high, the ring/lock muscle in the teat can also be damaged. This can sometimes be observed as a clear ring on the teat where the claw latches.
- Over-milking can occur when the cluster remains on the teat for too long and milk flow no longer occurs. Thus, with each pulsation, a vacuum will be formed at the milking point. It should be kept in mind that this also occurs at automatic cluster removers that terminate at a specifically lower milk flow, but the clusters are only removed a few pulsations later. The problem is most often caused when the milk flow is very low, and one quarter may still be milked while the other are already empty. The other quarters are thus overmilked.



Examples of over milking (Photos: Udder health and the milking machine a practical guide, Dr. Inge-Mariè Petzer)

- Stray electricity can put stress on the cows where adrenaline is secreted and counteracts oxytocin, which causes let down. This can cause cows to milk out more slowly and therefore be subjected to the vacuum longer.
- External factors that cause stress, such as noise, rough handling and sudden handling changes can also cause adrenaline, with the same results as above.

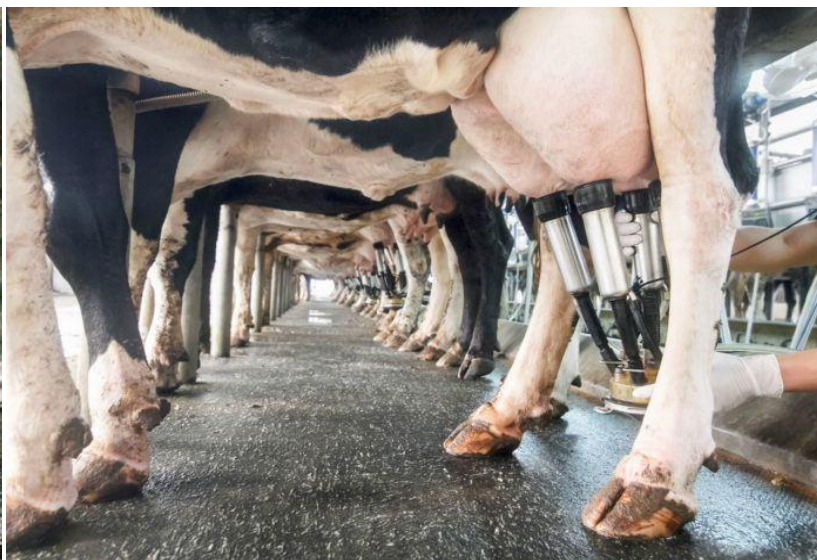
Somatic Cell Count Targets

In the ideal world, it would be simple to control the SCC in a herd by following recommended practices. However, as already pointed out, it is influenced by many factors. General targets may therefore not be appropriate for all herds, as this will depend on each herds' specific SCC level. In order to improve the SCC level in the herd, farmers should attempt to determine which factors are the major cause of the high SCC. Do not hesitate to call in the help of experts, as it is not always easy to determine these factors.

For herds with reasonably good SCC, the following goals should be achievable:

- 64% of cows should be below 100,000 SCC.
- 80% of cows should be below 250,000 SCC.
- The average SCC of the herd should be below 150,000.
- Less than 10% of treated cows should get mastitis again.

To this end, the practical farmer's rule applies: Happy cows have a happy owner, who delivers a quality product to a happy processor.



How do I interpret and use MUN values for the benefit of my herd?

Suretha Francis and Schalk Greyling

Milk-Urea-Nitrogen Values (MUN) are available for individual cows as well as for bulk tank samples. Milk urea nitrogen is a very useful tool at the farmer's disposal to monitor changes in the feed and nutrition of their herd. The following points may help in interpreting the results.

What is Milk Urea Nitrogen?

Milk-Urea-Nitrogen is a part of milk proteins that result from Blood-Urea-Nitrogen. The ideal average MUN values range from 10 to 14 milligrams per decilitre. When animals ingest feed containing crude protein, the protein is used by microbes and converted to microbial protein or incorporated as amino acids and peptides in the small intestine. If there is excess crude protein and the microbes cannot convert all the protein into microbial protein, the excess protein is broken down to ammonia by the microbes. The ammonia can diffuse through the cell walls and change the pH. The liver then converts the ammonia into urea to be excreted mainly in the urine, milk (as MUN) and uterine fluids. However, it can also be recycled by saliva to the rumen.

If MUN values are high, protein is wasted, and feed costs are increased. High levels also negatively affect milk production, herd fertility, embryo survival as well as immune function. Low MUN levels indicate a decrease in the number of rumen bacteria that limits the production of milk and protein.

What nutritional factors influence MUN values?

The most important factor is the adequate supply of carbohydrates available in the rumen to provide the rumen microbes with energy to convert the ammonia into microbial protein.

Nutritional situations in which MUN can increase:

- Too much total crude protein in the ration. It may also result in a waste of excess protein, a very expensive component in the feed.
- Nutrition of excess rumen degradable protein (RDP) may also lead to an increase in MUN, even if the ration's crude protein content (levels) is normal.

- If acidosis occurs in the animals, the growth of the microbe protein is inhibited, and the ammonia is not utilised.
- Rations that are low in fermentable carbohydrates such as starch, sugar and/or digestible (effective) fibre can also lower the growth of microbes in the rumen and also lead to an increase in MUN. This results in a poor rumen microbial environment that lowers microbial growth (low pH, no fibre material in the rumen, abnormal volatile fatty acid profile or slow rate of flow).

What are the ideal MUN values?

Each herd may have its own optimal average MUN value. It usually depends on feeding times relative to milking times, TMR vs grazing and Partially Mixed rations, eating patterns of the animals as well as other factors affecting blood-urea-nitrogen.

- Determine a value that is “normal” for your herd (varies between 8-16 mg / decilitre)
- If the normal value changes by 2-3 units, determine what could have caused the change.
- Look at weekly / monthly averages as values can vary quite a bit from day to day.

Nutritional and management changes that may lead to higher MUN values:

- Fresh new maize silage may not necessarily contain the same levels of fermentable carbohydrates (Less or no starch available in the rumen).
- Cows consuming lush pastures can increase total and degradable protein intake.
- Change in silage, some are wetter and higher in crude protein and may increase the MUN.
- Coarse ground grain can also slow down the rate of fermentation in the rumen.
- The use of unprocessed corn silage can also reduce available fermentable carbohydrates.
- The use of a better degradable protein source (use of raw soybeans instead of heat-treated soybeans) can also lead to an increase.

Nutritional and management changes that may lead to lower MUN values (<8):

If the rumen does not maintain certain minimum levels of ammonia, it can result in a reduction in milk production and protein production. This is due to a reduction in microbe protein synthesis. If the herd's MUN is low, feed extra crude protein or use a different source of protein. The changes should then be monitored for MUN concentrations in milk.

Herd or bulk tank MUN vs individual MUN values?

Herd MUN values are very similar to herd somatic cell counts when interpreting the data. The average may seem correct but there may be a group of animals with relatively high MUN values while others have extremely lower values. Feeding groups should be monitored to be able to manage MUN levels. It is therefore important to participate in production recording as all the production data is available as well as each animal's days-in-milk information. The MUN values can, therefore, be used in conjunction with milk production records, nutritional management practices and dry matter intake, degradable and non-degradable protein, carbohydrates and water intake of the animal. It can be monitored whether certain stages in the lactation are problematic or whether they occur throughout the lactation. This is especially problematic if the MUN values are higher in the early lactation animals as it is the group of animals that have to become pregnant again. They are especially those that are in a negative energy balance and where the high MUN puts even more pressure on their nutritional needs.

Other factors that may influence the MUN values are the following:

- Season - MUN tends to be higher in the hot summer months. Also, remember that MUN values can be affected by heat stress.

- The time when the sample is taken: MUN values show a peak 3-5 hours after the animal ate.
- Milking per day: Herds that milk 3 times a day show higher MUN than herds that milk 2 X per day.
- AM / PM: Samples taken in the morning's MUN values are usually lower than those taken in the afternoon.

How MUN values are fine-tuned:

MUN is a tool to monitor the ration's protein and energy status. The following management practices must be monitored together with MUN values:

- Monitor ration and ensure that the crude protein is not too high or too low.
- Monitor the ration's starch and sugar levels.
- Monitor manure composition. Low MUN may result in firmer manure, looser manure may be due to higher MUN. However, many other factors can affect the manure composition in a herd that should also be taken into consideration.

Table 1 can be used as a general reference.

Table 1: Interpretation of Holstein Herd MUN with Milk Protein Levels in Early Lactation (New York DHI)

Milk Protein %	Low MUN (<12)	Optimal MUN (12-17)	High MUN (>18)
< 3 %	Protein deficiency DIP/SIP deficiency	Protein deficiency Carbohydrate deficiency in rumen AA deficiency	Excess Protein Excess DIP/SIP Carbohydrate deficiency in rumen AA not in balance
>3.2 %	Adequate AA DIP / SIP deficiency Excess carbohydrates in rumen	Balanced AA Balanced rumen carbohydrates	Excess DIP/SIP Carbohydrate deficiency in rumen

In short:

- MUN values can be used for reducing nitrogen excretion in the environment.
- Values may vary from herd to herd. Compare within a herd or groups of cows in a herd.
- If the MUN levels are out of range, give attention to the balancing of the ration, milk composition, nutritional management and nutrient balancing.
- Significant energy losses occur when a cow must convert ammonia into urea and excrete into the urine. Purchased protein is also quite expensive and should not be excreted in the urine.
- Decreased conception rates and immunity levels are also observed.

It can therefore be seen that it is crucial to manage MUN values in your herd to achieve increased profit, but also to benefit the cows' health and well-being.

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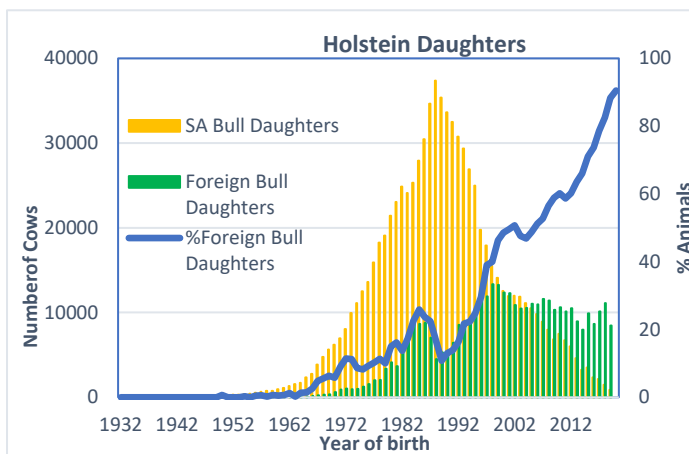
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Where do our Dairy Cows come from?

Dr BE Mostert

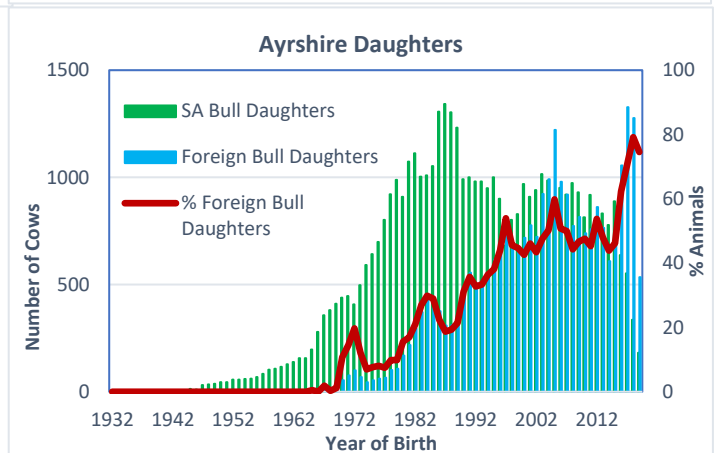
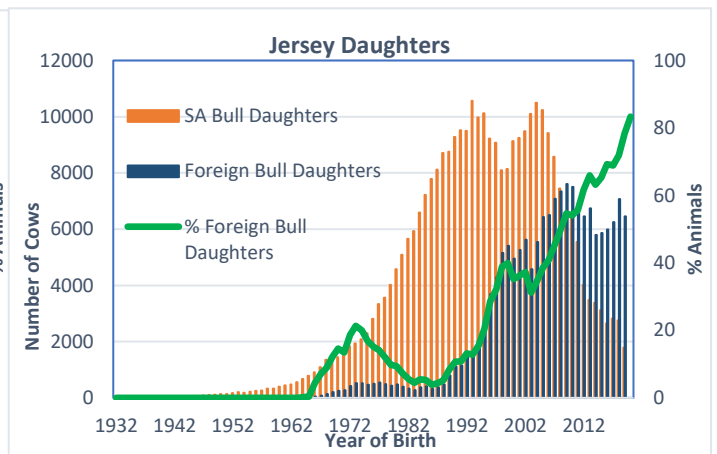
Ivanoff of Russia is seen as the pioneer of artificial insemination (AI). In 1899 he researched artificial insemination of birds, horses, cattle and sheep. Russia is therefore the country where the successful insemination of cattle on a large scale began. However, in 1936 Denmark established the first Artificial Insemination Cooperative in the world. In 1938, AI was established in the USA with 49% of dairy cattle born from AI in 1970. In South Africa, artificial insemination was started in the late 1940s to early 1950s with the establishment of four AI companies. In 1972, the Transvaal and Boland Co-operatives merged and in 1978 the others joined them to establish Taurus, South Africa's largest bull-testing AI centre.

Based on pedigrees of cows in Milk Recording, the first cow in South Africa, born from a foreign sire, was a Holstein cow born in 1949 from a bull in the Netherlands. The first Jersey cow born from a foreign sire was born in 1964 from an American bull and the first Ayrshire cow was born in 1965 from a bull from the United Kingdom. The following graphs show the number and percentage of cows born from South African and imported bulls over the years.



For Holsteins, the number of daughters born from South African bulls has rapidly declined since the late eighties, while the number of daughters from imported bulls has increased over the years. In 2000 - 2001 more or less the same number of daughters were born from South African and foreign sires, after which more daughters were born from foreign sires over all subsequent years. 90.5% of the cows born in 2019 were from foreign sires.

For the Jersey breed, one can see a very strong increase in the number of daughters born from imported semen since 2003. In 2008, the number of daughters born from South African and foreign bulls was more or less equal, with a sharp decline in the number of daughters born from local bulls since then. For cows born in 2019, 83% came from imported semen/embryos.

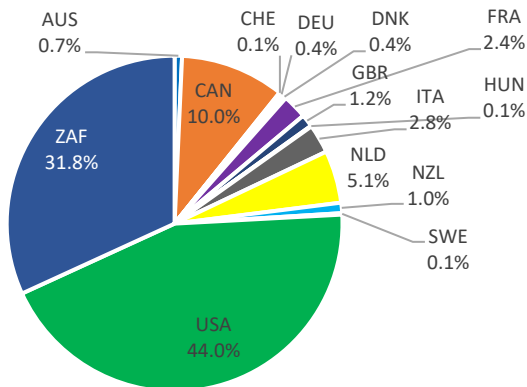


For the Ayrshires, more daughters were born from foreign than South African bulls in 1997, but only since 2016 has this remained constant, with 79% of the cows born in 2018 coming from foreign bulls.

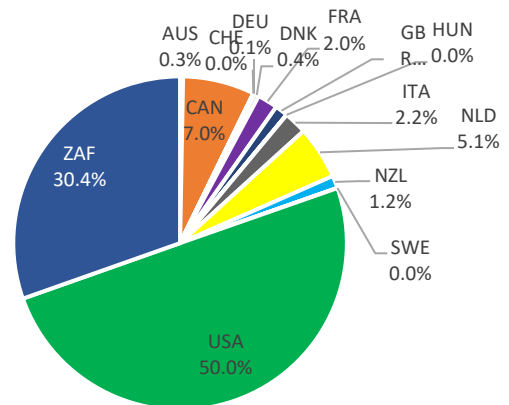
The proportional contributions from the different countries of the sires of the current active South African dairy populations are shown in the following graphs.

Active Holstein Population

Percentage Sires per Country of Birth



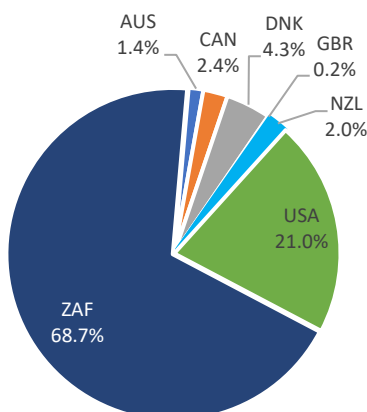
Percentage Daughters per Country of Sire



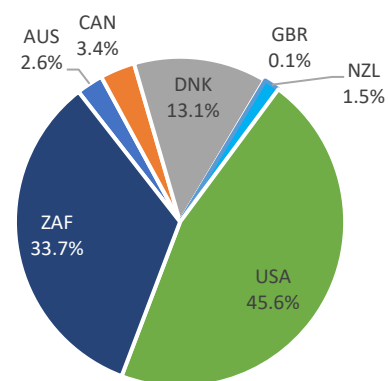
44% of sires of active cows and heifers are American bulls, while 32% are South African bulls, 10% Canadian bulls and 5% Dutch bulls. The rest of the bulls (9%) came from Australia (0.7%), Switzerland (0.1%), Germany (0.4%), Denmark (0.4%), France (2.4%), Great Britain (1.2%), Hungary (0.1%), Italy (2.8%), New Zealand (1%) and Sweden (0.1%). The percentage of daughters is very similar to this, with 50% of active cows and heifers being descendants of American bulls, 30% are from South African bulls, 7% from Canadian bulls and 5% from Dutch bulls.

Active Jersey Population

Percentage Sires per Country of Birth



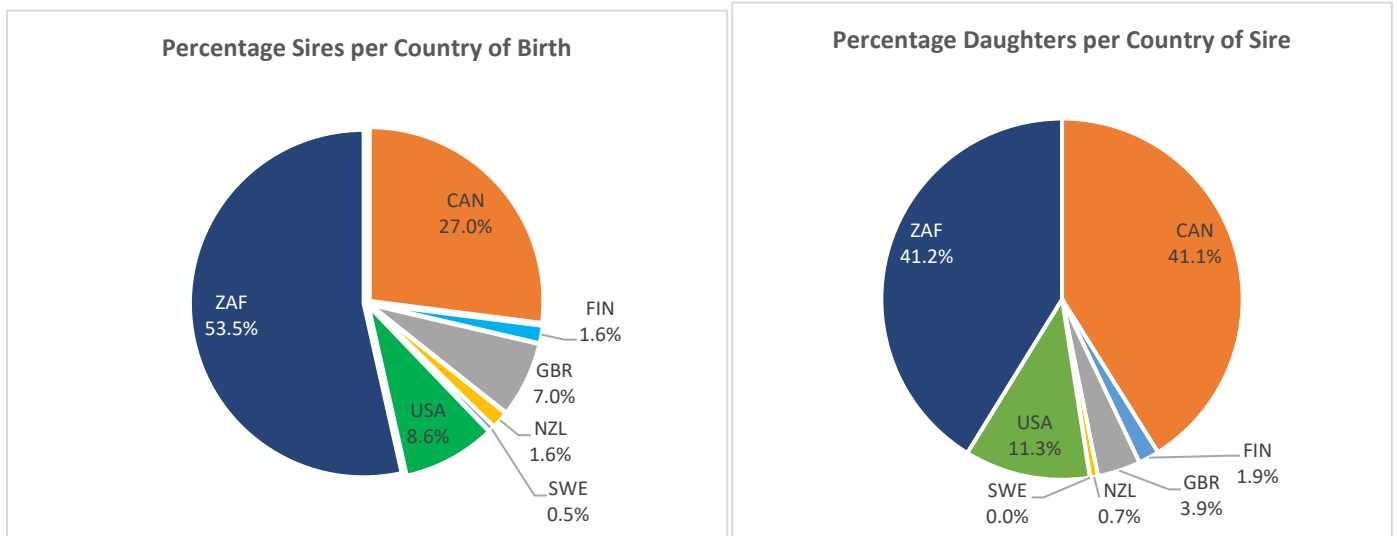
Percentage Active Daughters per Country of Sire



For the active Jersey population, 69% of the sires of the cow population are South African bulls, followed by 22% of sires from the USA. Other countries that currently form part of the active South African population are Denmark (4.3%), Canada (2.4%), New Zealand (2.0%), Australia (1.4%) and Great Britain (0.2%). However, when we look at the number of daughters per country of the sire origin, we see a very different picture. Most daughters (45.6%) are from US bulls, followed by 33.7% from South African bulls, 13.1% from Danish bulls, 3.4% from Canadian bulls, 2.6% from Australian bulls, 1.5% from New Zealand bulls and 0.1% from bulls from Great Britain.

53.5% of bulls that are sires of active Ayrshire cows are South African bulls, 27% are Canadian bulls, 8.6% are American bulls, 7% are bulls from Great Britain and the rest are from Finland (1.6%), New Zealand (1.6%) and Sweden (0.6%). Interestingly, there are the same number of daughters from South African and Canadian bulls (41%) in the active population, with 11% daughters from American bulls, 3.9% from bulls from Great Britain, 1.9% from Finnish bulls, 0.7% from New Zealand bulls and 0.03% Ayrshire daughters from Swedish sires.

Active Ayrshire Population

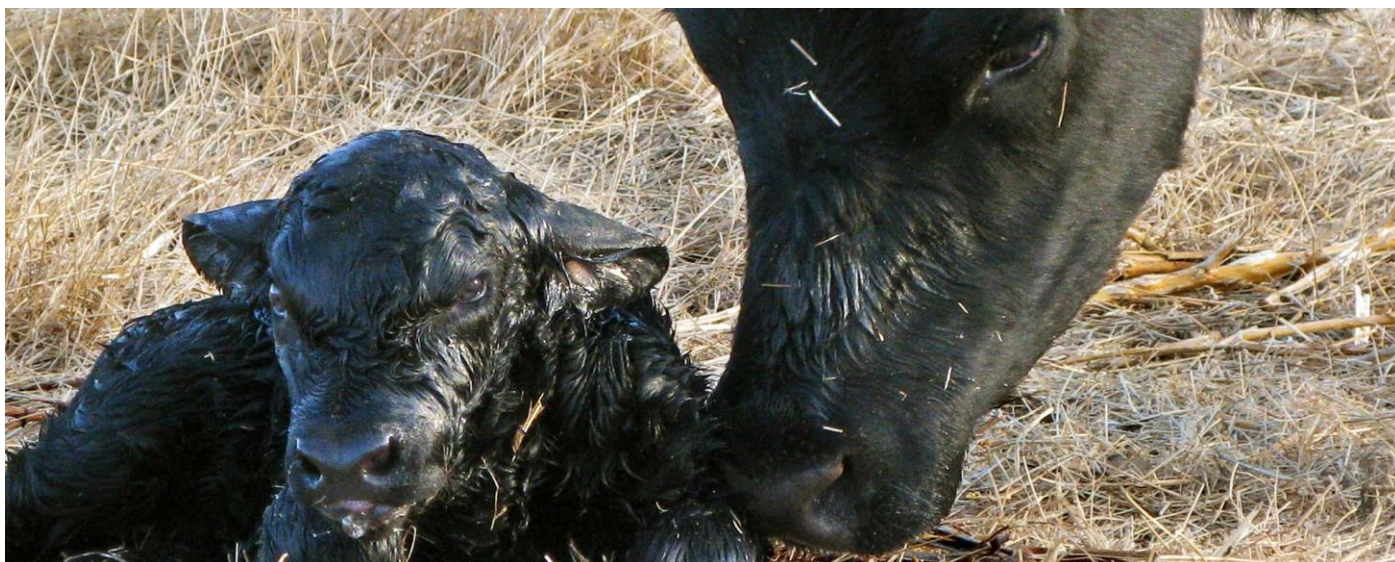


The following table shows the number of active daughters per bull for the different countries of origin of the sire. For Holstein, most active daughters/bulls are obtained from Danish and New Zealand bulls, with the Swiss bull (CHE) having only one active daughter. For Jersey, by far the majority of daughters/bulls are obtained from Danish sires, with the least from bulls from Great Britain. For Ayrshire, most daughters/bulls are obtained from Canadian sires, with the Swedish bull having only 1 daughter in the active population.

Table 1: Number of daughters / bull per country of sires.

Holstein		Jersey		Ayrshire	
Country of Sire	Daughters/bull	Country of Sire	Daughters/bull	Country of Sire	Daughters/bull
AUS	9	AUS	61	CAN	29
CAN	16	CAN	48	FIN	22
CHE	1	DNK	100	GBR	11
DEU	9	GBR	15	NZL	8
DNK	28	NZL	26	SWE	1
FRA	19	USA	72	USA	25
GBR	23	ZAF	16	ZAF	15
HUN	8				
ITA	18				
NLD	23				
NZL	28				
SWE	3				
USA	26				
ZAF	22				

The Logix Genetic Analyses for dairy breeds are based on many generations of information, ensuring the stability and reliability of breeding value prediction. Already in the 1970s, a significant increase in the number of daughters born from foreign bulls can be seen. In our current active populations 50% Holstein and 21% Jersey cows are born from American bulls, while 41% Ayrshire cows are born from Canadian bulls. However, the influence of South African bulls is still considerable, especially in the Jersey population, where 69% of active cows have South African sires, while 41% Ayrshire and 30% Holstein cows have South African sires.



Difficult Calving

Dr Helena Theron

During calving season, most cows calve unattended and unassisted and should be allowed to calve naturally. In the normal delivery of a calf, there are three stages of labour: initiation and preparation for the birth which lasts from 4-24 hours, the passage of the calf through the birth canal, which lasts between 30 minutes and 3 hours and expulsion of the placenta, which can last from 12-24 hours. If the labour is prolonged, it is an indication of the difficulty of birth, also known as dystocia. Despite the best efforts to avoid dystocia, a small proportion of cows and especially heifers may require assistance. Early intervention minimizes the effects of dystocia. As a rule of thumb, cows should be assisted if they have not delivered the calf within 2 hours from the time the water bag appears, or if more than 30 minutes elapses without progress.

A high level of difficult calving in a herd has a financial implication, as dystocia causes increased cow and calf losses. Cows that had a difficult calving may have delayed return to heat, as well as lower conception rates. Some studies have suggested that cows that previously experienced dystocia are more likely to do so again. Numerous interrelated and sometimes unknown factors influence calving difficulty. However, the incidence of dystocia in a herd can be lowered by managing factors that are known to increase the incidence of difficult calving.

Factors Affecting Dystocia

- 1. Calf's birth weight:** According to several studies, birth weight of the calf was the trait most highly correlated with calving difficulty. Difficult calving is usually caused by a disproportion of the calf size relative to the dam size.
- 2. Age of dam:** First-calf, two-year-old heifers are the most at risk, mainly because of their small body size and underdeveloped pelvis area. It has been shown that difficulty in two-year-olds is three to four times as high as in three-year-olds, and three-year-olds have about twice as much difficulty as four-year-olds. By the time a cow reaches 4 - 5 years of age, dystocia problems are usually minimal.
- 3. Nutrition and condition of the dam:** Cows should have an optimal body condition score of 3 to 4 to ensure easy calving. Over conditioned cows have a higher risk of dystocia and metabolic disorders in early lactation, due to more fat lining the birth canal; whereas too thin heifers may be too weak to calve, which is associated with weak labour, difficult calving, poor growing calves, difficulty to get into calf again and increased mortality. It is recommended that heifers reach at least 85% of their expected mature weight at first calving. Little is known about the effects of nutrition in early and mid-gestation, but care should also be taken not to overfeed cows in the last trimester, as this could increase calf birth weight.

4. **Pelvic area:** One of the major causes of dystocia is the disproportion between the size of the calf and the pelvic opening of the dam, especially in first-calf heifers. However, selection for an increased pelvic area without some constraints on body size could result in a parallel increase in birth weight and mature size and little change in calving ease. Pelvic size should be viewed as a threshold trait and heifers with the narrowest pelvic width, (rather than pelvic area), should be culled.

5. **Cow size:** Smaller heifers tend to have a higher incidence of dystocia than larger heifers, but the correlations are low (-.01 to .20). It is the ratio of calf birth weight to the dam weight which is the most important factor.

6. **Calf shape** probably plays a role in dystocia, but it is extremely difficult to quantify.

7. **Breed: Breed of dam:** Zebu and Sanga cows tend to have calves with lower birth weights and experience less incidences of dystocia when compared with European breed cows. Researchers reported that calf growth during the last 20 percent of gestation is dramatically lower in Brahman than in European breed cows. This difference is probably due to differences in uterine blood flow and function of tissues. **Breed of the sire** is important in crossbreeding, especially if it causes an increase in birth weight.

8. **Uterine environment:** Research has also shown that dams differ greatly in the growth rate of the calves they are carrying. This can be measured and selected for in the Birth Maternal breeding value.

9. **Abnormal presentations** of the calf accounted for 22% of dystocia and 4% of all births in one study. **Twins** also tend to have difficulty, mostly because of abnormal presentations.

10. **Factors with a small effect: Sex of calf:** Bull calves are more likely to cause difficult calving as they are generally larger and heavier than heifer calves. **Gestation length** is not highly correlated with dystocia but plays a role as longer gestation length causes a higher birth weight, which in turn increases the risk for calving difficulty. **Environment** - Geographic region, season of birth, and temperature can all affect calf birth weight, which in turn affects the possibility of dystocia. Geographic region differences can probably be attributed to differences in nutrition and temperature. Calves born in autumn are generally lighter in weight and experience less dystocia than those born in the spring. High environmental temperatures will reduce birth weights, while low environmental temperatures are related to heavier birth weights and increased calving difficulty. All of these effects, however, do not play a large role.

11. **Other unknown factors:** Research shows that less than 50% of the total variation in dystocia can be explained by factors that can be defined or measured. It is therefore sometimes difficult to determine the reason for dystocia and difficult if not impossible to eliminate dystocia.

What the breeder can do:

Although difficult calving cannot be eliminated, breeders could manage environmental effects like the birth weight of the calf, age of the dam and condition of the cow. A combination of calving heifers at three years or only selecting larger heifers to calve at two years and using bulls that sire calves with small birth weights may reduce dystocia significantly. Breeders should select bulls with low birthweight EBVs for use on heifers while maintaining at least moderate weaning and growth EBVs. EBVs for Birth Maternal indicate the ease with which a bull's daughters will calve.

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Crossbreeding

Dr Helena Theron

Most commercial farmers know that mating cattle of different breeds results in increased performance in the crossbred calves relative to the average of the parental breeds. This article explains the benefits and economic importance of crossbreeding.

There are two primary advantages to crossbreeding:

- **Breed Complementarity:** the ability to combine traits from two or more breeds into one animal. For example, some breeds are known for adaptability or reproductive performance, whereas other breeds would add additional growth performance to the progeny.
- **Hybrid vigour, also known as heterosis:** the tendency of crossbred individuals to show qualities superior to the average of their parents.

Heterosis is not the same for all traits, and generates the largest improvement in lowly heritable traits, such as reproduction and longevity (Table 1). The greatest impacts on profitability from heterosis are the increases in overall production and longevity of crossbred cows.

Table1: Heritability and heterosis for important traits.

Trait	Heritability	Level of Heterosis
Maternal Ability Conception Reproduction Health Calf survival Cow longevity Overall cow productivity	Low	High (10 to 30%)
Growth rate Birth weight Weaning weight Yearling weight Milk production	Medium	Medium (5 to 10%)
Mature weight Skeletal measurements Carcass / End weight	High	Low (0 to 5%)

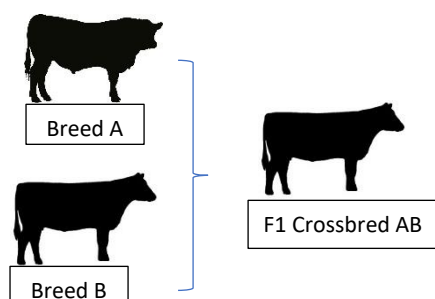
Measuring heterosis

Heterosis can be measured. For example, Breed A averages 200kg at weaning, and Breed B averages 240kg at weaning. When crossed, the A × B calves weigh on average 230kg at weaning, which is higher than the mid-parent average of 220kg. The hybrid vigour from this mating can be calculated with the following equation:

$$\text{Hybrid vigour} = \frac{(\text{Crossbred performance average} - \text{Straightbred performance average})}{\text{Straightbred performance average}} = \frac{(230 - 220)}{220} = 4.5\% \text{ Improvement}$$

Individual heterosis

The hybrid vigour for the F1 or first-generation cross in this example is 4.5% above the average of the parent breeds for weaning weights. This is known as individual heterosis and is generally seen in growth traits of the crossbred offspring.



Maternal heterosis

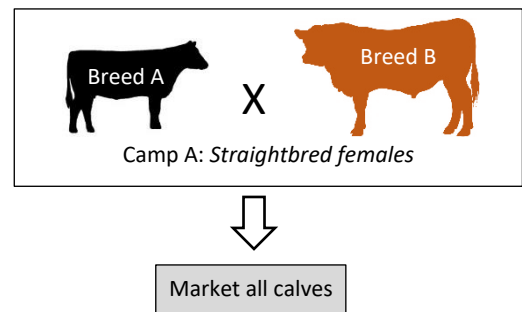
Maternal heterosis is the increase in average production observed in crossbred F1 cows compared to straight-bred cows. They often have increased calving percentages, wean heavier calves and have greater longevity. Enhanced production from the crossbred cow is the primary benefit of a planned crossbreeding system.

Crossbreeding Systems

There are different ways of benefitting from crossbreeding in which one can utilize both individual and /or maternal heterosis.

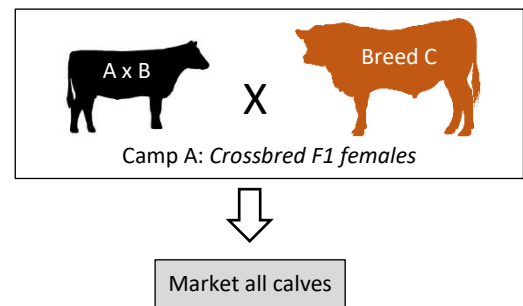
Two-breed Terminal Crossbreeding System

- Simple, basic crossbreeding system
- Breed A x Breed B
- 100% individual heterosis and no maternal heterosis
- All F1 progeny are marketed
- F1 replacement heifers can be sold as breeding females
- Replacement heifers are purchased, or homebred.

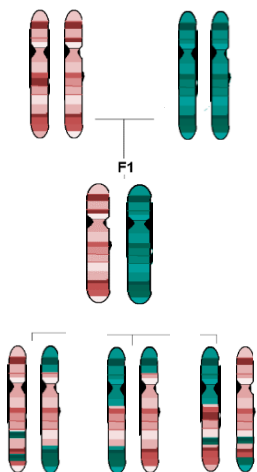


Three-breed Terminal Crossbreeding System

- The most hybrid vigour of any crossbreeding scheme
- Crossbred AB cows X Breed C sires
- 100% individual and 100% maternal heterosis
- All F1 progeny are marketed
- Purchased F1 replacement heifers should be environmentally adapted with the necessary maternal capacities.
- Terminal sires can be selected only on growth and carcass with no attention to maternal traits.



Sustainability

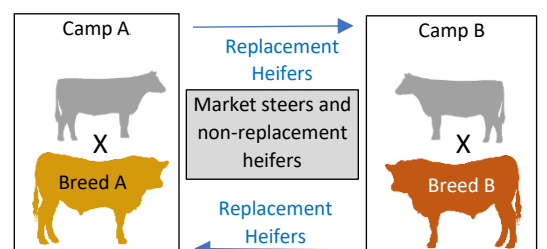


Hybrid vigour yields its greatest advantages in first-generation crosses (F1) because hybrid vigour is not transmitted from generation to generation without continued crossbreeding. When crossing F1 with F1, the favourable combinations deteriorate due to recombination, and in practice, the genetic make-up of the F2 progeny are somewhere in between the parent breeds. The heterosis effect is lost.

In terms of hybrid vigour, the ultimate female is therefore the first-generation cow (F1) from the mating of two purebreds from different breeds. The challenge, however, is to maintain a continuous supply of F1 crossbred heifers as a purebred parent population would need to be maintained or replacements would need to be purchased elsewhere, which most producers are reluctant to do. This problem is overcome by various crossbreeding systems which have some degree of heterosis but can become very complicated. Composite breeds also utilize heterosis without the need for continuous crossbreeding.

Two-breed Rotational Crossbreeding System

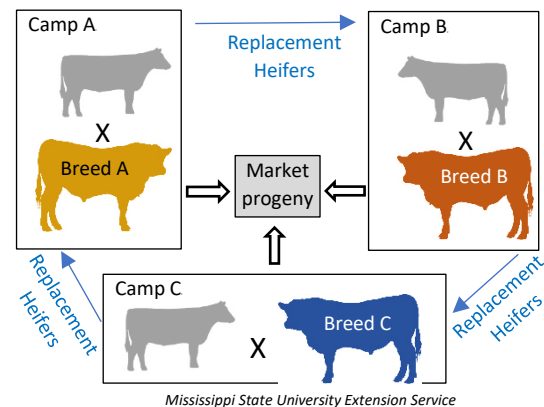
- Effective and relatively simple
- Females sired by Breed A are mated to sires of Breed B, and females sired by Breed B are mated to sires of Breed A.
- Heterosis stabilizes at 67% of potential individual and maternal heterosis after 6 generations.
- As replacement heifers sired by Breeds A and B are retained, both breeds should therefore have maternal characteristics.
- Two sires are required, therefore at least 50 cows and two camps are needed.



Mississippi State University Extension Service

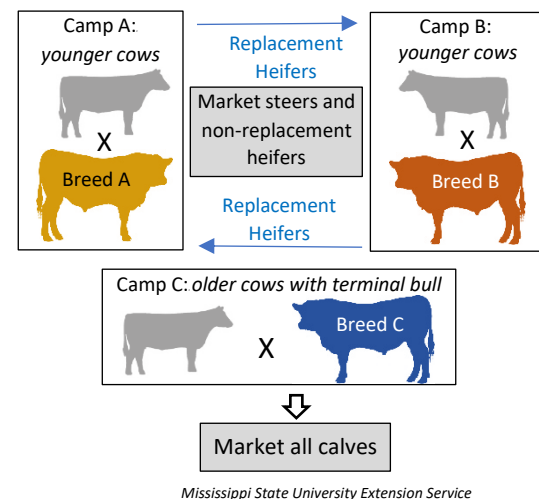
Three- and Four Breed Rotational Crossbreeding Systems

- Similar to the two-breed rotation with another breed added.
- Three-breed system: Breed A sires are mated to females sired by Breed B, Breed B sires are mated to females sired by Breed C, and Breed C sires are mated to females sired by Breed A.
- Hybrid vigour stabilizes after several generations at 86% (3 breeds) and 93% (4 breeds) of potential individual and maternal hybrid vigour.
- Replacements are retained from within the herd.
- Three sire-breeds require at least 75 cows in 3 camps, while four sire breeds require at least 100 cows in 4 camps.
- The ability to locate 3 or 4 breeds that fit a given breeding scheme can be challenging.
- For only a slight gain between 3- and 4-breed systems, the system becomes very complicated. Benefits may not outweigh the cost.



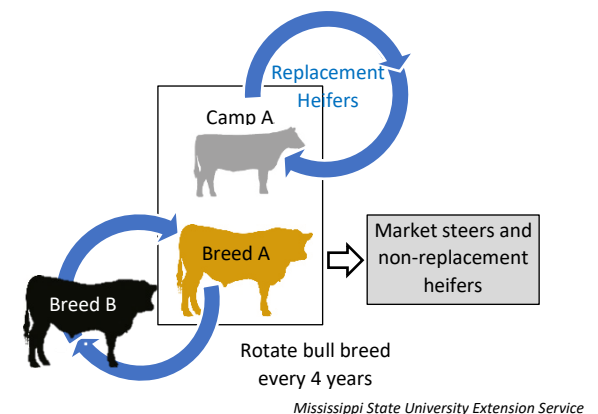
Three-breed Roto-Terminal Crossbreeding System

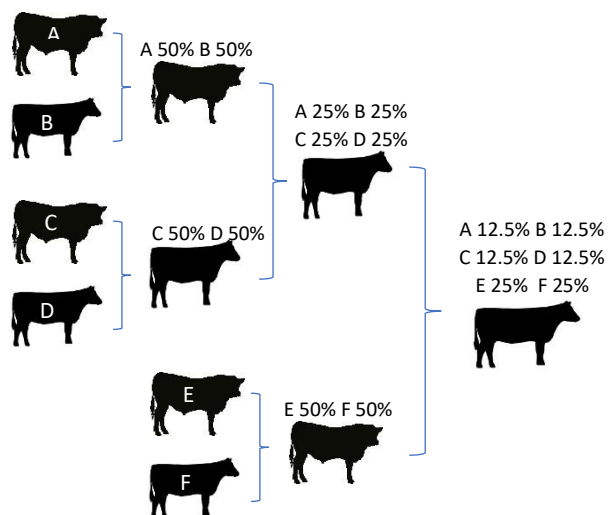
- Extension of the two-breed rotational system with a terminal sire added.
- Some cows (especially heifers) are placed in the two-breed rotation to produce replacement heifers, and the rest (older cows) is mated to a terminal sire to produce calves that are all marketed.
- The breeds used in the two-breed rotation must still be selected for the criteria specified in the rotational programs.
- Terminal sires can be selected for increased growth and carcass traits to maximize production from the cowherd.
- More labour, management, and breeding pastures are needed than in a two-breed rotation.



Sire Rotation Crossbreeding System

- Common crossbreeding system.
- One breed of sire is used for 4 to 6 years, and then the sire breed is changed.
- This system can use two, three or more breeds.
- As only one breed of sire at a time is required, one camp and any herd size are sufficient.
- A relatively high level of heterosis is maintained, usually >50% depending on the number and sequence of sires used.





Composite Breed

A composite breed has traits of economic importance from many breeds which is then maintained as a straight-bred herd. This system has the advantage of being very easily managed once the composite breed is established (which takes many generations/years) and it can capture a higher amount of existing genetic variation among breeds than other crossbreeding systems.

Table 2 provides a summary of beef cattle crossbreeding system details and considerations.

Table 2. Summary of crossbreeding systems by amount of advantage (% increase in calf weaned per cow exposed) and other logistical considerations (From Crossbreeding for the Commercial Producer, www.eBEEF.org, 2017-2)

Type of System	Scheme	Advantage (%) ^a	Retained Heterosis (%) ^b	Minimum # of Camps	Min. Herd Size	# of breeds
2-breed Terminal Cross	T x (A)	8.5	0 ^c	1	Any	2
3-breed Terminal Cross	T x (A*B)	24	100	1	Any	3
2-Breed Rotation	A*B Rotation	16	67	2	50	2
3-Breed Rotation	A*B*C Rotation	20	86	3	75	3
2-Breed Rotational with Terminal Sire	Overall	21	90	3	100	3
Composite Breeds	2-breed	12	50 ^d	1	Any	2
	3-breed	15	67	1	Any	3
	4-breed	17	75	1	Any	4
Rotating Unrelated F1 Bulls	A*B x A*B	12	50	1	Any	2
	A*B x A*C	16	67	1	Any	3
	A*B x C*D	19	83	1	Any	4

^a Measured in percentage increase in kg of calf weaned per cow exposed

^b Relative to F1 with 100% heterosis

^c Straight-bred cows are used which have 0% maternal heterosis; calves exhibit heterosis which is responsible for the expected improvement in weaning weight per cow exposed.

^d Estimates of the range of retained heterosis.

Conclusion

Crossbreeding systems range in complexity from very simple programs such as the use of composite breeds, which are as easy as straight breeding, to elaborate rotational crossbreeding systems with four or more breeds. A crossbreeding system should take advantage of breed complementarity and heterosis. Although the individual change in some traits are small, it has been found that lifetime production can increase by more than 20% in programmes designed to capture both individual heterosis in crossbred calves and maternal heterosis in crossbred cows. It is also important to select all bulls on breeding values for the desired traits – starting out correctly will also increase gains.

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Breeding for Profit (The State of Queensland)

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Genes that affect Early Fertility in Males and Females

Jason Reding

The cow/calf operation on a beef cattle farm incurs the largest proportion of profits and costs within the herd. Female fertility is therefore important. Heifer Fertility is indicated as Age at first calving (AFC), which is measured as the number of days from birth to first calving. It is indicative of sexual precocity, which is defined as the appearance of secondary sexual characteristics before the normal age of pubertal onset.

Scrotal circumference (SC) is the most used trait for male fertility. The quality and quantity of spermatozoa producing tissue directly contribute to a bulls' overall fertility. An SC of 28-30cm is associated with an onset of puberty in 52-97% of bulls.

According to some literature, a bull's SC has shown to be negatively correlated (phenotypically and genetically) with his daughters' AFC. This translates to the larger the SC of a bull, the earlier his daughters will conceive and give birth to their first calf. Table 1 illustrates that an earlier measurement of male fertility via SC is a better representative of his daughter's potential precocity than a later measurement (Bonamy *et al.*, 2018).

Table 1: Genetic correlations between AFC and SC at different ages in a foreign Angus herd.

	SC 300 Days	SC 400 Days	SC 630 Days
AFC	-0.478	-0.244	-0.152

Improvement of fertility traits has typically been slow due to the low heritability and their late expression. An understanding of the genetic basis of fertility traits is required to implement selection programs that may increase reproductive efficiency. The true underlying genetic architecture of most traits remains unknown;



genomic tools have now opened opportunities for different approaches to improve our understanding.

A recent genomic study was completed on a SA beef cattle breed by analysing the underlying mechanisms of AFC and SC. A total of 11 genes were identified across the two traits indicating the complexity of these traits at a genomic level. Table 2 illustrates three genes identified to be associated with SC or AFC.

Table 2: Genes associated with AFC and SC and their respective biological roles in a SA beef cattle breed

Trait	Gene	Biological Role (Protein activity)
AFC	AKT3	Serine/Threonine Kinase
SC	PPP3CA	Serine/Threonine Phosphatase
SC	TRPM6	Serine/Threonine Kinase

Upon studying sexual hormone secretion patterns, one can conclude that the mechanisms that initiate puberty in both sexes are controlled by the same mechanisms. Thus, the results in Table 1 are favourable in that different genes with the same biological roles are associated with male and female fertility traits. PPP3CA has previously been identified to have a significant effect on sexual precocity in six beef cattle breeds (Dias *et al.*, 2015, 2017).

A better correlation between AFC and SC may allow for the estimation of breeding values that are more representative of an earlier onset of puberty and the identification of animals that show favourable reproductive efficiency. In conclusion, measuring the testicular growth of a bull during early pubertal phase will better reflect a genetically driven early starting of the hormonal signaling system that triggers reproductive function and in turn female precocity. This may help in a better ability to uncover the true genetic mechanisms that affect the onset of puberty.

References

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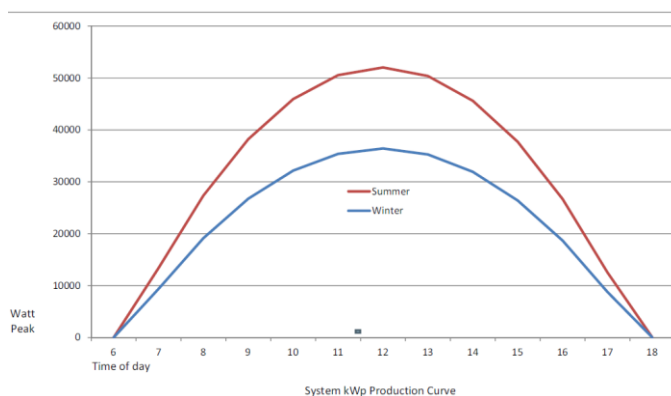
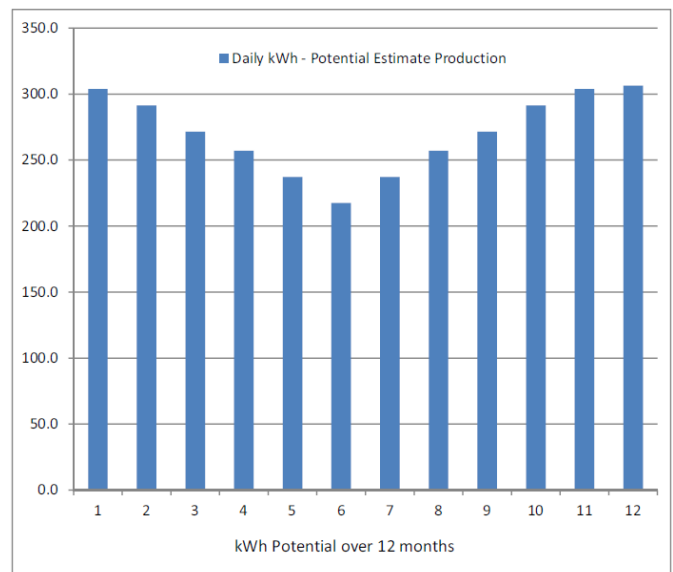
Going Green at Stud Book

Japie van der Westhuizen

Energy efficiency is the name of the game, as the pun goes. In all Stud Book's endeavours, factors contributing towards more efficient animal production, plays a major part of the Association's focus. For animal production, energy efficiency can be defined as the relative energy output associated with the energy needed. Total herd or flock efficiency should therefore consider the energy intake of all the animals, including non-productive breeding stock as well as those delivering on the outputs.

The source of all energy on earth is the sun (so I am told). Of all the natural resources available in South Africa, sunlight is probably the most abundant.

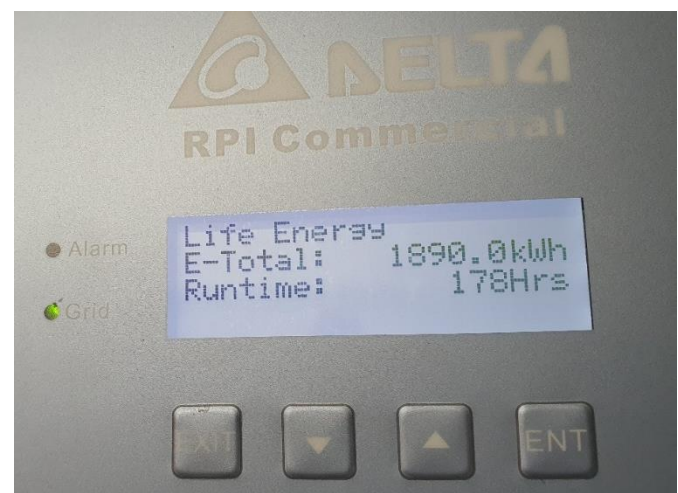
Stud Book has therefore embarked on an energy efficiency journey by firstly looking into energy wastage in the Stud Book building. The first step was to replace all lighting in the building with LED-based energy-efficient light sources. The average energy saving is more than 50% and a much brighter office environment. The big step, however, was the installation of an intelligent energy system, making use of photovoltaic panels utilising sunlight and other sources of electricity. The calculations show a full return on investment within 3 to 4 years, depending on tariff increases from the local electricity distributor (currently at R1.61 per KW Hour).



generator is at the heart of these measures. The new intelligent system incorporates these components to optimise power usage while also safeguarding Stud Book's battery of computer servers and arrays of data disks.

Like charity, efficiency starts at home. Stud Book joined the new revolution by making use of the original energy source, while at the same time striving to utilise the available energy as efficiently as possible. After all, you cannot expect something from future breeding stock without taking the same responsibility.

Smart electric systems are really smart. At the heart of Stud Book's operations are the computer Servers carrying millions of valuable data records from livestock and companion animals and carrying out complex calculations such as genomic breeding values. Safeguarding this asset is of vital importance at Stud Book. A bank of UPS (Uninterruptable Power Supply) units and a standby



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