

ZiMUNDA

FARMING



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From the Editor

As the winter season sets in, it's time to turn our attention to winter cropping. With the recently completed summer crop harvest, farmers across the country have been busy reaping the fruits of their labour. This year's summer crop harvest has been especially noteworthy, with many farmers reporting bumper yields and high-quality produce.

As we move into the winter months, it's important for farmers to plan their winter cropping strategies carefully. Winter can be a challenging time for crop growth, with shorter days and cooler temperatures, but with the right approach, it's possible to achieve a successful harvest. The livestock industry suffers the same fate, facing different challenges especially with nutrition as pastures are nutritionally low quality.

In this issue of ZiMunda farming magazine, we'll be exploring the latest winter cropping techniques and sharing tips and advice from experienced farmers and technical experts. We'll also be taking a closer look at the recent summer crop harvest, analysing the latest industry marketing trends i.e. in tobacco and discussing some tips on grain storage.

As always, we welcome your feedback and suggestions for future topics. We hope you enjoy reading this issue of our farming magazine and wish you all the best for the upcoming winter cropping season.

Yours In Farming

Nimbai



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The aim of ZiMunda Farming is to provide correct and relevant farming information to farmers. Every effort is made to check the content of every article, the directors will thus not be held responsible for errors or omissions in such articles. Farmers should thus consult with the references and resource people before making any financial or production decisions.

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Insights into Phytosanitary Measures in International Trade

Dr. Biandri Joubert, Specialist in Sanitary and phytosanitary measures - non-tariff barriers in international trade



A state of the art packhouse at Nhimbe Fresh, Marondera. one of the largest fruit and veg exporters in Zimbabwe. See Zimunda Newsletter Issue 18.

Exporting fruits and vegetables involves complying with international trade rules and regulations related to plant health and food safety. These measures are in place to protect human, animal, and plant life from potential risks associated with trade. In this article, I discuss phytosanitary measures in international trade, drawing from data provided by the World Trade Organization (WTO), and guidelines provided by the International Plant Protection Convention (IPPC), and the Codex Alimentarius. Under the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS), countries are permitted to prioritise food safety and plant health over trade, but only if there is a scientific basis for their regulations. This can make the application of these regulations complicated for governments, farmers and traders.

When exporting fruits and vegetables, these products are specifically subject to phytosanitary measures, which are science-based rules related to the export of plants or plant products. The importing country has the right to require certain safeguards through phytosanitary measures to ensure that the products do not pose a higher than acceptable risk to human, animal, or plant life or health. Disputes can arise when there is a disagreement over the severity or extent of risk, or other SPS-related principles. For instance, there is currently a dispute between South Africa and the European Union regarding amended false codling moth cold treatment measures applicable to the Southern African citrus industry

when exporting to the EU. This dispute has been brought to the attention of the WTO through a formal request for consultations by South Africa (at the date of writing this has not progressed beyond requesting consultations).

International Standard Setting: The IPPC and Codex Alimentarius

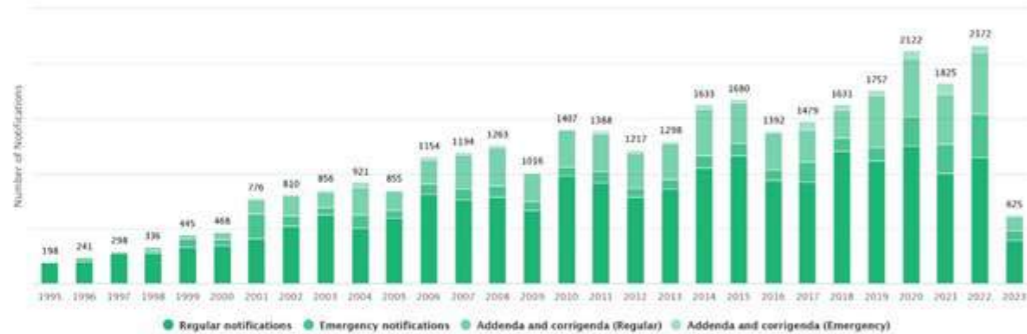
Zimbabwe is a contracting party of the International Plant Protection Convention (IPPC), which is responsible for promoting the creation and implementation of standards, recommendations, diagnostic protocols, and phytosanitary treatments. The IPPC is recognised by the WTO as one of the “three sisters” of international standard setting bodies for SPS measures, and its International Standards for Phytosanitary Measures (ISPMs) are particularly relevant for those involved in exporting fruit and vegetables. The IPPC has developed 46 adopted ISPMs, 31 Diagnostic Protocols and 45 Phytosanitary Treatments. Exporters must comply with the importing country’s specified standards or measures, which can come from either the IPPC or Codex Alimentarius (or both depending on what the product is), and must be based on objective and accurate scientific data. These global standards or ISPM’s serve the following purposes: Safeguarding sustainable agriculture and improving worldwide food security; Preserving the environment, forests, and biodiversity; Promoting economic and trade growth. Examples of ISPM’s that are of relevance

to farmers and exporters of fruit and vegetables are ISPM 01 Phytosanitary principles for the protection of plants and the application of phytosanitary measures in international trade; ISPM 03 Guidelines for the export, shipment, import and release of biological control agents and other beneficial organisms; ISPM 15 Regulation of wood packaging material in international trade; and many more.

Notification of Phytosanitary Measures

In international trade, notifying other members of new, amended, or emergency measures is crucial. This enables affected members to provide comments on proposed regulations and for the implementing member to consider any objections or concerns before implementing final measures. It is especially important for trading partners to receive notifications of measures that do not align with international standards or recommendations, as they may want to scrutinise the scientific basis for these measures and possibly object to their validity. Governments are encouraged to disseminate regulations and establish a National Enquiry Point to respond to inquiries from other members. It is also recommended that members publish their SPS regulations online, like the EU, to ensure easy accessibility. Knowing about new or proposed changes in measures in advance may also, for example, save exporters money if it enables them to avoid rejections at the border by allowing for proactive adaptation of processes etc. in the exporting industry.

The WTO has data on the number of notifications related to SPS measures since its establishment in 1995. The graph below shows the totals of all SPS notifications (not just plant related ones) per year since 1995. In 2023, there are already more SPS-related notifications than what the whole of 2000 and preceding years had in an entire year. Most of these notifications are regular notifications.

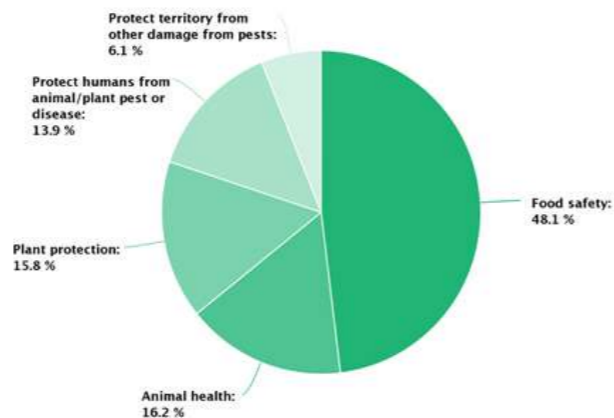


Number of SPS notifications per year. Source – WTO e-ping portal (April 2023)

The increasing number of annual SPS-related notifications over the years, as shown in the graph, is significant and could indicate several things. Firstly, it may reflect the growth of international trade, which in turn necessitates the implementation of more SPS measures and standards to ensure the safety of trade in food, plants, and animals. Another possible interpretation is that the rise in notifications demonstrates greater transparency and the opportunity for stakeholders to provide feedback on proposed measures that could affect them adversely. This increased transparency may lead to smoother trade flows. Since 1995, the top 10 notifiers under the SPS agreement have been the USA, Brazil, Canada, the EU, and Japan.

When a measure is notified, the notifying Member State must provide a description of why the measure is being proposed or implemented. They must therefore state the

objective of the measure. The pie chart below reveals that a significant proportion of the objectives recorded in notified measures relate to plants, which is of particular interest to those exporting fruits and vegetables. While plant protection accounts for 15.8% of these objectives, the protection of humans from animal/plant pests or diseases (13.9%) and food safety (48.1%) cover both sanitary and phytosanitary issues.



Objectives of SPS notifications. Source – WTO e-ping portal (April 2023)

The WTO data provides another interesting insight into the notifications - the frequency of key words associated with them. “Pesticides” has the third highest incidence rate with 7322 mentions, following “food safety” and “human health”. It is closely followed by “plant health” and “maximum residue limits (MRLs)”, highlighting the significance of staying up-to-date with international standard setting bodies and the constantly adapting measures when involved in exporting fruits and vegetables.

Pesticide Use and the International Trade of Fruit And Vegetables

Given the high incidence of the word “pesticide” in the notifications, pesticides are a good example of the relevance of this field of international trade law and the related notification processes to farming with fruit and vegetables. Pesticides include chemical or biological insecticides,

fungicides and herbicides. It is not always possible to farm without them. This need is recognized internationally and for that reason standards and measures exist to ensure, as far as possible and as the science evolves, that the products registered for agricultural use do as little harm as possible to both those consuming and applying the products but also the environments in which they are used and that the exported plant or crop poses as little pest risk and food safety risk as possible to the importing country. Pesticides are registered for use in various countries across the world. Measures are taken to minimize their negative impacts while also facilitating their use in agriculture. The importance of these measures as well as a countries’ ability (and often their right in terms of international standards) to entirely ban or very strictly regulate active ingredients that they accept as residue limits deemed to be safe for human consumption through fruit and vegetables is something to actively consider in day to day farming. Metconazole, Fludioxonil,

Spinosad, Spirodiclofen and Glufosinate-ammonium are a few examples of the many active ingredients in insecticides, fungicides and herbicides (i.e pesticides) for which the codex alimentarius specifies MRL’s in blueberries, for example. As described by the FAO’s codex alimentarius, maximum residue limit (MRL) is the highest level of a pesticide residue that is legally tolerated in or on food or feed when pesticides are applied correctly in accordance with Good Agricultural Practice. Understanding the protocols available on pesticide labels and applying correct dosages and withholding periods is vital for participation in international trade. Exceeding an MRL can justifiably result in a rejection of the crop. Deviating from a label by, for example exceeding the approved dosage or by applying a product unregistered for the crop you are growing could result in a rejection on MRL grounds. More importantly, it could have an impact on the health of consumers or animals eating the product in question. MRL’s differ between countries and this often leads to barriers in international trade and in some instances significant trade disputes between countries.

To read more about the notifications and standards discussed in this article scan the QR code below.




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HORTICULTURE


Blueberries, WWzone the top export crops in Zimbabwe. See ZiMunda Issue 10.





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Improving Frost Tolerance Through Nutrient Management and Biostimulants

By Ronald Rusere, Technical Agronomist

Good plant mineral integrity is a key strategy that can be used to alleviate frost stress in crop plants. Nutrition plays a greater role in improving frost tolerance. Research has found that the key mechanism for improving frost tolerance on crops is maintaining a higher internal sap sugar and soluble solids content. If crops are healthy and photosynthesising well enough, it can ultimately raise the internal sugar and brix levels. A one percent (1%) increase in brix will result in a half a degree ($\frac{1}{2}$) gain in frost tolerance (see Zimunda Newsletter issue 14, brix level).

Calcium - Calcium is an essential plant macro-nutrient that is pivotal for maintaining the structural integrity of cell walls. Calcium is a component for cell division, development, stability and penetrability of cell walls. It reacts with pectic acid to form pectin, when a plant has more pectin instead of water it increases tolerance to frost. Calcium plays an important role in the recovery of crops from freezing injury.

Potassium - Adequate potassium levels protect a crop against freezing by lowering the freezing point of the plant's cell solution. Furthermore, an adapted cytosol potassium concentration is also essential for enzyme activities that are involved in regulating frost resistance. Potash deficiency in crops, leads to a reduced stomatal activity resulting in poor control over gas exchange, impairing photosynthesis and water control, making crop vulnerable to stresses from frost. Enzyme activity which plays a part in frost resistance rely on adequate potassium levels.

Excessive nitrates - High nitrates develop weak cells and this can intensify frost effects. Oversupplying nitrates can make a crop vulnerable to frost since nitrates enter the plant with a lot of water and dilute concentrations of water-soluble carbohydrates (lower the brix level), also restrict potassium uptake and other minerals that in turn act as natural antifreeze agents.

Silicon - Silicon increases the plant's ability to produce antioxidants and reducing yield losses associated with various stresses including cold stress. Silicon works in synergy with calcium (calcium silicate) increasing cell wall strength and reducing the risk of cells collapsing or bursting as a result of stress conditions.

Biostimulants - They perform best when crops are supported by proper nutrition. This is crucial in order to get the best results, if we do not address nutritional imbalances we will not get the best out of the biostimulants. It is crucial that biostimulant treatments for the purpose of improving stress tolerance be applied before the stress occurs for the purpose of conditioning the plants for improved stress. An adequate



Winter crops

supply of micronutrients such as copper, manganese, boron, zinc, iron and cobalt can increase frost tolerance significantly.

Proline (Max Prolin) - Crops under stressful conditions tend to accumulate metabolites, e.g. amino acids such as Proline. Proline plays a role in cell osmotic adjustment and membrane integrity. L-cysteine increases the level of proline which enables plants to withstand stress longer and continue development under stressful conditions. It protects the plants from stresses and also promotes rapid stress recovery. After recovering from stress, proline converts to a source of carbon, nitrogen, energy and reducing equivalents, which increases photosynthesis and makes the recovery of normal plant metabolism easier.

Seaweed/ Kelp - Application of seaweed can lead to a 3-4 degree gain in freeze tolerance. The lipophilic components of the brown seaweed (*Ascophyllum nodosum*) increases freeze tolerance by increasing the total soluble sugars, altering of fatty acid composition and accumulates proline. Seaweed also contains sugars (mannitol) which act as an osmoprotectant and alginic acid, a key component cell wall component, which increases water balance and also potassium which both lower the freezing point of cell fluid, so it raises plant sugar, plants with a higher sugar content have a lower freezing point, also it strengthens cell walls. Stronger cells hold onto their water and are less likely to collapse under freezing conditions. Seaweed also contains plant growth regulators such as (cytokinins and betaines) important role in cellular osmotic adjustment, which is associated with improved freezing tolerance.

Salicylic acid - Salicylic acid is known to help mitigate against abiotic stress. Adequate concentrations of salicylic acid help to induce the synthesis of protective compounds



A comparison of Vitazyme treated and untreated brassica crop by Damara Bio-Agri. Vitazyme is a natural and effective foliar bio-stimulant that can be used on all crops, at a rate of as low as 1 litre per hectare.

such as polyamines that enhance frost tolerance. Salicylic acid enhances the synthesis of antioxidant enzymes, ice nucleation activity, increases total phenolics synthesis and other phenol derivatives known to improve the frost tolerance of plants.

Vitazyme - Triacantanol increases the content of photosynthetic pigments which has been shown to improve the tolerance of crops to cold stress. It is a potent photosynthetic enhancer which raises the brix level in a crop. Triacantanol also contains brassinosteroids which increases antioxidant enzymes and proline content shown to improve growth even under cold temperatures. Humic substances - Humic and fulvic acids, which improve tolerance to abiotic stress as a result of polyphenols and are excellent brix builders.

Amino acids - Low temperatures slow down plant absorption of amino acids, applications of exogenous amino acids can be important that will the maintenance of the firmness of the plant cell membrane, minimising frost damage. Amino acids promote the quick recovery of crop and promotes the formation of cells and new tissues in the plant.

Overall, good mineral integrity is key in improving frost tolerance. Nutritional integrity of plants is the foundation for producing extraordinarily healthy crops that can endure abiotic stresses.

Ronald Rusere is a Technical Agronomist at Humuson Complex. For more information, contact call/WhatsApp +263774690553 or email ronaldrusere@outlook.com



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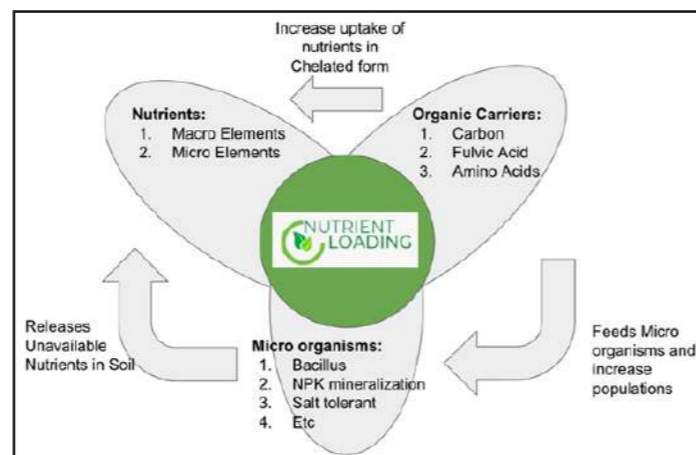
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Feed the Soil Not the Plant And the Soil Will Feed You Forever!

By **Vimbai Ruvengo and Ian Dewar**

Wise farmers have known for thousands of years – “feed the soil, not the plants” however the introduction in the early part of the last century of chemical fertilizers resulted in a lot of knowledge being lost and abandoned, to the detriment of the soil. The reality is, plants do not grow independently, they grow in a partnership with a diverse colony of micro- and macro-organisms including fungi, beneficial bacteria, micro-arthropods, nematodes, insects, and worms. Scientists are just beginning to understand the complexity of soil and its tremendous amount of biodiversity. In the recent past in Zimbabwe, there is a good buzz on the practices such as Regenerative agriculture and organic farming through organisations such as Foundations for Farming. Companies like Organic Fertilizer Manufacturers Africa (OFMA) and GuanoBoost, have become advocates for “feeding the soil, not the plants”.

nutrients, minerals, and mycorrhizal fungi. They also can provide horticultural molasses, a natural sugar that feeds soil microbes. Using these solutions has proven to increase yields and decrease costs while healing the soil and being good for the environment.



About OFMA and GuanoBoost

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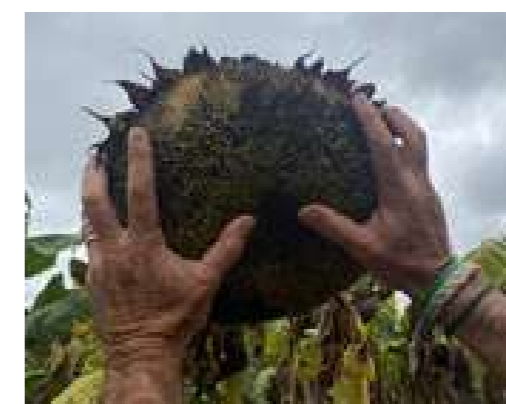
Kundai David Gotora, the 2022 Zimbabwean Young Farmer of the Year 2022 uses only OFMA Granules and GuanoBoost. Kundai based in Marondera grew record, lettuce, celery, watermelon, cherry tomatoes, English cucumber, patty pan, baby marrow, red pepper, green beans, and red cabbage. DenFarms (Dendairy) now use OFMA and GuanoBoost products exclusively on their pastures, showing a significant increase in yields and quality of crop whilst driving down costs. Foundation for Farming trial on sunflowers using OFMA granules and GuanoBoost. Look at the size of that head!

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For more information, contact Ian on ian@organics.earth or sales@organics.earth.



Pastures at DenFarms



Sunflowers at Foundations For Farming



Tomato Physiology, Nutrition and Yield

By Ronald Rusere, Technical Agronomist



Tomato Nutritional Objectives And Plan

The goal is to produce high yielding, uniform, high brix and heavy plum tomato fruits. When it comes to the crop, strive to produce plants which are dense, flat across the top, have tight internodes and canopy, fruit uniformity, ideal fruit size, more fruit per cluster, more weight per fruit and a lengthened shelf life. To produce such a high yielding crop of marketable fruit focus on supplying the right nutrition at all the points which are crucial when the plant is making “decisions” about its reproduction or future yield. Good nutritional integrity will lead to plants having abundant energy to produce more flower clusters with uniform size and fruit uniformity.

There are key stages in a plants cycle where a nutritional supplement or even stress will have a huge impact on crop genetic expression. The key stages on a tomato plant that surely need to be influenced by nutrition are:

- Transplanting and establishment: Strong plant structure capable of handling a large reproductive load, big roots. Balance between root and shoot dominance.
- Vegetative growth: rapid canopy growth and development with tightly spaced internodes, healthy and higher quality vegetative growth.
- Reproductive bud initiation: bud count, uniformity, size and energy in buds, flower size and timing.
- Flowering/ Pollination: Number of flowers pollinated, timing or speed of pollination, length of pollination window/ pollen strength.
- Cell division: development of many high integrity cells.
- Fruit fill: large quantities of sugars are produced in the leaves and transported to fruit.

Tomatoes are a multiple fruiting crop, that can have many flowers per cluster, yet in some scenarios only produce very few marketable fruit per cluster. They can abort many of the



Farming is science! The basics of crop nutrition depend on an understanding or appreciation of crop physiology, in order to know how different nutrients are used by the crop. The attainment of high quality tomato yield hinges on identifying key nutrient windows of opportunity so that one can tap into the genetic potential of the crop. If you miss that window (which can be narrow), then you could miss the opportunity to influence yield. Understanding of the crop's nutritional needs at different stages of crop growth is critical in developing an effective tomato nutritional program.

“The best nutrient programs follow the concept of the Five Rs right nutrient, right crop stage, right form, right nutrient mix (not all nutrients work well together in the plant at the same time e.g. Calcium and Potassium) and right place in the plant (roots vs leaves).”

The way we apply nutrients or design our nutritional programs can limit us in terms of yield.



set flowers or fruit embryos and nutritional stress is a key factor. This stage is affected by how much calcium and micro nutrients are transported to the flowers (during pollination and cell division) from the tomato plant.

A nutritional program should aim to produce very healthy plants with an abundance of energy that will contribute to very uniform flower size and ultimately fruit size in each cluster, the more energy a plant has, the higher the degree of fruit uniformity. Uniformity of fruit size is a key indicator of plant energy levels. Plants with abundant energy produce flower clusters with uniform size and fruits with uniform maturity. Nutritional stress is a key factor that limits the realisation of yield potential. Reaching the genetic potential of tomatoes requires us to recognise these key windows in a crops cycle and how we can impact them to get the best economic response.

Sometimes a variety can have the genetic potential to develop many flowers and set a lot of fruit however, lack the nutritional integrity will lead to the plant not supporting those blossoms, the root system, stem diameter for both water supply and nutrients to fill the fruits.

It is important to be aware of the key stages in a tomato crop growth cycle which determine the yield potential and how to best influence the tomato **crop by delivering the right amount of the right nutrition in the right form at the right time** (nutrients should align with these key stage in order to influence them). Nutrient applications should come in the front end of the nutrient demand curve, not the top or the back end of the curve. Nutrition needs a proactive approach, which is application of nutrients in the 2 weeks that lead up to that stage, when the nutrient is being used by the plant for maximum effectiveness.

Transplanting and establishment: This will give a strong plant structure, capable of handling a large reproductive load. Vigorous robust root systems. Good balance between root system and shoot dominance.

Vegetative growth: rapid canopy growth with tightly spaced internodes, healthy and higher quality vegetative growth. Leaf size that can deliver enough photosynthates to flowers and fruit. Large stem diameter to supply water and nutrients to fill all the fruits.

Bud initiation: Supply nutrition that will impact bud size, number, uniformity, size and timing of blossoms. Bud uniformity will influence fruit uniformity. Size of the primary, secondary or even tertiary blossoms should be the same. Key minerals support this stage which are Calcium which increases reproductive energy; Manganese for a strong bud count; Boron which facilitates calcium transport and strength of buds; Zinc for the leaf aspect ratio; Copper for pollination and tube strength; and Kelp/ seaweed which triggers strong bud set and increases number of buds.

Flowering and pollination: Nutrient application is targeting number of flowers pollinated, timing or duration of pollination window, pollen strength and viability, pollen tube strength. Calcium is crucial for cell membrane integrity, cell division, manganese, boron, zinc, copper. There are other biostimulants that can influence this stage such as kelp.

Cell division: Occurs in the few days after pollination, critical for cell development and later production of large heavy fruits. Calcium, Boron, phosphorus and Manganese are crucial. Plants demand for calcium is highest during the early season from flowering through early fruit development when most cell division and elongation happens.

Fruit set/ formation and fill: This window is characterised by cell expansion, the plant should get a signal that there is plenty of energy at the stages when fruit set is determined. There will be an increased volume of sugars produced in the leaves and transported to the fruit. Important minerals at this stage are potassium, nitrogen, manganese, calcium, zinc, boron, phosphorus, copper which also influence fruit uniformity and size.

Ripening or fruit finish: Supply of adequate trace minerals to support this stage (colouring, flavours), shortage will result in early senescence. Some nutritional programmes tend to “peter” out near the finish line. Management of key nutrients can speed up senescence e.g. Boron (Mo,Mg,S) or delay senescence e.g. Cobalt by inhibiting ethylene formation.

Ultimately a farmer should reach a point where his/her crop is nutritionally balanced (high brix). A healthy (high brix) fruit which is nutrient dense does not rot in storage, but dehydrates. Fruits that quickly spoil reveal issues of a lack of nutrient imbalances e.g. too much nitrates or shortage of key minerals.

Ronald Rusere is a Tech Agronomist at Humuson Complex. For more information on tomatoes, call/WhatsApp +263774690553 or email ronaldrusere@outlook.com



Bringing Probiotics to Animal Feed Producers and Farmers in Zimbabwe

CATTLE

By Marne Visagie of United Animal Health In Association With Shumba Group and Coopers Animal Health.



Gut health is an essential component of overall health in animals. A healthy gut microbiome plays a vital role in ensuring that the animal performs to its genetic potential. Probiotics are becoming increasingly popular in animal production as a natural and effective way to maintain a healthy animal population.

What is Gut Microbiome?

The gut microbiome refers to the microorganisms, such as bacteria, fungi, and viruses that inhabit the digestive tract and break down the nutrients in the feed. The digestive system also plays a critical role in regulating the immune system, thus affecting the overall health of the animal.

There are various factors, such as the animals diet, antibiotic use, and environmental factors, that affects the gut microflora, both positively and negatively.

•**Diet:** A well balanced diet will ensure that the animal has a good feed conversion ratio and average daily gain. If there is an excess protein in the diet, it will not be absorbed and will reach the large intestine where it will act as a substrate for unwanted bacteria to grow and proliferate, leading to dysbacteriosis.

•**Antibiotic use:** Systemic use of antibiotics can reduce the diversity of the gut microflora, which will negatively affect digestion and utilisation of nutrients in the feed. It is thus often recommended to use strategies to improve the health of the animal and the microflora before problems in production arise. These strategies include well balanced diets, and in-feed additives such as probiotics and enzymes.

All About Probiotics

Probiotics can have multiple benefits in animal production

and overall profit to the producer. It allows producers to reduce the use of antibiotics, improve animal welfare and production by optimising the environment and reducing ammonia levels. Probiotics also allows animals to utilise feed more efficiently and thus reducing the amount of feed required for production.

Not all probiotics are created equal, and it is essential to choose the right probiotic for your animal's specific needs. When choosing a probiotic, look for a product that is developed based on what the gut microflora requires as certain strains have different outcomes on the gut. Multi-strain products, although tend to be more expensive, have a higher and more consistent efficacy. Historically, Bacillus strains were selected from the soil or plant and then administered to animals. The next generation of probiotics select Bacillus strains from healthy top performing animals.

When a good probiotic is used, the Bacillus strains will replicate and grow in the gut and create a healthy well-balanced intestinal flora. This, in turn will lead to digestive enzyme production, immune modulation and pathogen specific interactions. When the animal has a healthier gastro intestinal tract, the producer will reap the economic benefits due to improved animal performance, reduced health problems and reduced ammonia levels on farm.

In conclusion, maintaining optimal gut health is crucial for overall health and well-being in animals. Probiotics can be an effective and natural way to promote gut health by restoring the balance of beneficial microorganisms in the gut microbiome. With the right probiotic, you can help support optimal gut health and promote overall wellness in your animal.



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Beef Cattle Winter Nutrition

By **Richard Dennison**, Specialist Nutritionist at Feedmix



Beef cattle make use of veld for both grazing and browsing and both the veld and supplementary feeds need to be managed in such a way that production and profit are maximized on a sustainable basis.

Managing On-Farm Forage

On farm forages are usually the cheapest food sources for cattle and to utilise them sustainably rotational grazing should be practiced. Each herd should be allocated a minimum of 4 paddocks with a central water point so that paddock 1 is grazed in summer from December to April, paddocks 2 and 3 are grazed in winter from May to November and paddock 4 is rested for a year. Burning of the rested paddock should be carried out in October, should not be more frequent than every 3 years and only be used to remove moribund (grey) grass and reduce bush encroachment. Then in the following year paddock 1 is rested, paddock 2 is grazed in summer and paddocks 3 and 4 are grazed in winter. This rotational pattern is repeated so that a complete cycle takes 4 years.

Paddocks need to be allocated according to veld types because topland and red soils are more sensitive to grazing than vleis and sandveld, so small areas of vlei and sandveld should be included with large areas of topland and red soils. The ecological region of the country will determine the carrying capacity on comparable soil types as generally carrying capacity is proportional to the average rainfall. For example, in region 2 the optimum paddock size for 25 to 30 livestock units is 60 to 120ha. Vleis would be about 60ha and woodlands would be about 120ha. I have taken a livestock unit to weigh 450kg.

In low rainfall years rotate grazing between all the paddocks not burnt in early summer and destock to the point where the forage available is sufficient. The foot of the farmer grows the grass and the eye of the farmer fattens the cow. If you cannot destock to that level, then you have the option of

providing bush meal or purchasing Beef Survival Meal fed at the rate of 4kg per livestock unit where veld forage is absent or very little.

Winter Protein Supplementation

Why is winter protein supplementation recommended? This is basically because perennial grasses exhibit declining protein levels as they mature so that by winter these levels have dropped to 3% or less. In the extensive ranching areas in the southern lowveld rainfall is low and annual grasses tend to predominate. Here protein supplementation is not recommended because the dry grasses are like standing hay with higher protein and digestibility than perennials. A useful rule of thumb is that a pregnant livestock unit cow needs 6kg of dry matter at 6% crude protein for maintenance of livemass. Bigger cows and cows in late pregnancy or lactating will require more. Thus, at an intake of 6kg of dry matter grass at 3% crude protein per day, the protein deficiency would be $6\text{kg} \times 0.03 = 0.18\text{kg}$ or 180g.

Other basic guidelines to protein supplementation worth remembering are as follows.



1. Cow productivity is determined by weaned mass of calf per annum.
2. Cows should weigh at least 85% of peak mass to reconceive. No calf means no profit as you cannot have half a calf.
3. You need pregnancy diagnoses and reliable cow records to know which cows to keep and supplement.
4. The priority ranking on supplementation is in-calf heifers, then in-calf cows that have just weaned their first calves, then in-calf cows for the second successive year, then yearling heifers that will be mated the following summer and lastly weaners. Weaners are not usually worth supplementing.

For example, Winter Blocks containing 35% crude protein and 6% urea have half of the crude protein coming from the urea which is a cheaper protein source than plant protein. They should also contain a significant amount of iodized salt to help to guard against over consumption of the block and consequent over consumption of urea. The management of using these blocks as a protein supplement for cattle need to follow the following guidelines.

1. Put out Salt Blocks at the rate of one per 100 head of cattle for a week before introducing the Winter Blocks.
2. Put out the Winter Blocks at least 300m away from the water source to prevent cattle from quenching their thirst from salt intake and then overconsuming the blocks. Target bare areas where the soil is capped to break up the capping and encourage new grass growth during the rains.
3. Arrange the blocks in a circle at least 10m apart to limit

- bullying by dominant animals. Cows are more inclined to bully down a straight line than across a circle.
4. Put out the blocks twice a week.
5. Start feeding blocks in June or when you observe the cattle eating grass seed heads.
6. Feed 600g of block per head per day in midwinter to a mixed herd, rising to 700g/day in late winter. For large herds with many paddocks where, for example, heifers, cows and weaners are in separate herds, feed 900g per day in midwinter and 1kg/day in late winter to 2 to 3-year-old pregnant cows, 500g per day in midwinter rising to 700g per day in late winter for cows bearing their second consecutive calf and feed yearling heifers and in-calf cows that were dry last season as for a mixed herd.
7. Bulls should be fed separately on a bull maintenance meal that is urea free as they are usually too valuable to risk being fed any urea. They should only join the cows in the summer bulling season.



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The Power of Buying Local

By the Zimbabwean Boran Breed Society

History states that in the early 20th century cattlemen in the Laikipia, Rift Valley and Machakos Districts of Kenya adopted and improved the local Zebu for commercial ranching – today's Boran. The merits of the breed were then recognized and the breeders united to form the Kenyan Boran Cattle Breeders Society in 1952. Naturally the world was watching and because of the breeds' outstanding traits and productivity efficiencies. Its popularity soon spread around the African continent like wild fire.

The Von Pezold family, owners of Forrester Estate with their vision and pioneering spirit set about the almost unimaginable task of introducing, for the first time ever to Zimbabwe, the superior Boran breed. Through a three-month comprehensive embryo collection and implantation program, the first Boran calves were born in Zimbabwe in 1993. South African farmers started importing Kenyan Boran genetics soon after.

THE CURRENT SITUATION

Taking a peak at the timeline of the genetic importation into Zimbabwe, farmers such as the Kaiser Boran Stud joined the Boran Family in 1999 and today as we speak the Zimbabwean Boran Breeders Association has 60 registered stud breeders and 7019 registered Boran. Within all of these breeders, approximately 40% can safely say that they have imported Boran genetics into the country. Good - growing the national Boran herd and introducing a wide range of new genetics, but what does it mean?

GROWING FROM WITHIN

In all simplicity, this means that Zimbabwe is now home to some of the top Boran lines (as found in Kenya and South Africa) and better yet they are now LOCALLY ADAPTED!!!

Buying local now has a whole new meaning and it presents tremendous advantages to all those looking to introduce Adapted Boran Genetics into their enterprises;

1. Locally adapted animals

Despite being in almost the same climatic condition, all cattle brought into Zimbabwe from South Africa have to adapt to the local environment and dietary conditions. This transitional stress can lead to temporary suppression of breeding, by imported animal as they acclimatise - a negative on the productivity of the farm. Where-as animals bought from LOCAL STUD BREEDERS are already adapted to the Zimbabwean environment, hence a smoother transition and acclimatisation process.

2. Acquire similar genetic lines as South African but for fewer dollars.

One of the main reasons for cattle importation is the injection of lines (genetics) into a farming enterprise. Over recent years both bulls and cows bought from very reputable South African Boran stud breeders have been imported, some costing upwards of USD 10 000 (acquisition costs, clearance, transportation) – a fortune indeed. But this is where it gets good – now that the lines are within the country, one can acquire stud animals at a fraction of the price of importation from ZIMBABWEAN BREEDERS.

3. One can physically inspect the animals at minimum cost

Lights, camera, auction is the new order of the day. Online video auctions combine modern-day technology ease to accessibility for buyers. Farmers in Zimbabwe can comfortably buy from South African cattle sales from the comfort of their homes. But hold on, this presents a challenge –one has to depend and hope that the cattle on



sale are accurately represented in their description. It is time consuming and costly, to be there physically to inspect animals on the sale – a tedious and expensive endeavour as compared to BUYING LOCAL!

4. Absence of importation quarantine and lengthy paperwork

Livestock importation is complex because of the legislations that govern it. There are many parts to the system, different people play different roles to ensure animal welfare, health and veterinary requirements are met. This process can be lengthy, expensive, tiresome and has room for errors, as some farmers have reported that their livestock have reached the border, only to find that there was missing paperwork that was needed for the animals to proceed without delay or even been returned. When BUYING LOCAL this headache can be minimised and the stress is neutralized for both farmer and animal.

5. Minimised transportation risk

A number of transportation consequences can be identified as being highly relevant for the welfare of cattle during transportation; these include group stress, handling stress, heat stress, injuries, motion stress, prolonged hunger, prolonged thirst, respiratory disorders, restriction of movement and resting problems. These challenges are usually faced due to inexperienced/untrained handlers, inappropriate handling, structural deficiencies of vehicles and facilities, poor driving conditions and unfavorable micro-climatic conditions, compounded by lengthy travel. Hence one has to be extra careful to minimise this risk during importation. While buying local, these stresses are significantly reduced.

6. Guarantee that the animal is registered in the herd book

The ZBBS sets and maintains standards of the Boran. Imported and local Boran are inspected before they can be registered in the Zimbabwe Herd Book. Inspectors will reject any animal showing functional or structural defects such as excessively pendulous sheaths, lack of pigment, faulty feet and legs, temperament and abnormalities of any description. Since visual evaluation is an important part of the selection process, some imported animals have been rejected for registration in the Zimbabwean Herd Book – a huge disappointment to farmers who would have imported Borans.

Buying local promotes the local cattle industry, its stud breeders, nurtures the Boran breed from within Zimbabwe and supports our local farmers.

Contact the Society boranzimbabwe@gmail.com on for more information on the Boran and come to our 8th National Sale to acquire your local Boran genetics.



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Possible Causes of Low Milk Production

By Cyprian Kunaka

The dairy industry is hugely important to the Zimbabwean economy and food security. Despite dairy being a significant and longstanding industry, it faces unprecedented challenges which affect the productivity of milk. Factors that affect milk productivity include;

1. Improper Dry Cow Nutrition.
2. Lung Damage, Pneumonia, Lungworms.
3. Internal Parasite Problems Which Can Be Controlled By A Proper Dosing Regimen.
4. Toxicity, Deficiencies Or Imbalances In Vitamins, Trace Elements And/Or Minerals.
5. Diseases Such As Foot Rot And Tick-Borne Diseases
6. Lack Of Cow Comfort, Heat Stress Or Lying Down Time.

7. Low Dry Matter Intake (DMI)

This is the amount of feed consumed excluding water. Low feed intake reduces milk production levels. Causes of low dry matter intake are;

- Empty feed troughs or insufficient feed. Feed should always be available (24 hours daily) for dairy cows
- Poor quality feed, that fails to meet the nutrient requirements for the target dairy cow or heifer.
- Lameness (feet problems), heat stress, poor housing and lack of cow comfort.
- Metabolic feedback high fat level in diet especially above 6%, low rumen pH below 6.8 optimum reduces fibre digestion, moulds in feed or mycotoxins affect the liver and are also excreted in milk.
- High level of indigestible fibre such as neutral detergent fibre and lignin lead to low quality forages. This can be determined by laboratory testing of feeds fibre levels.

Suggested Solutions

- Always feed fresh palatable known high quality feed (ascertained by laboratory or divulged by feed producer).
- Feed more frequently to avoid fluctuations in rumen Ph.
- Reduce forage particle size but not less than 1 inch for roughages.
- Consider adding molasses for palatability and enhanced intake.
- Ensure that fresh clean water is available 24 hours.
- Clean out feed troughs regularly.

8. Mastitis

This is an inflammatory reaction of udder tissue due to physical trauma or microorganism infection. Its possible causes include;

- Udder infections resulting from bacteria introduced during milking or from environmental contact. Examples include contamination from milking equipment, milking personnel, manure contamination, dirty stalls, dirty milking unit liners and dirty water used to clean udders.
- Genetically low udders and leaking teats.



Suggested Solutions

- Review milking procedure, practices and hygiene, pre and post dip with good teat dip preferably chlorine-dioxide based teat dip with emollients for teat conditioning
- Keep cow udders clean between milking and maintain good teat condition
- Attach and remove milk clusters carefully
- Culture and identify the causative bacteria check if there is a recurring herd problem. Only treat known causative organisms
- Clip or burn long and udder hair regularly
- Treat all cows with Dry cow therapy at the end of each lactation.

9. Metritis

This is the inflammation of uterus caused by bacterial infection characterised by abnormally large uterus, watery red brown uterine discharge. Occurs within the first 21 days after calving but is commonly seen in the first 10 days after calving. Its causes are inclusive of;

- Bacterial infection post calving.
- Retention of placenta due to selenium or vitamin E deficiency.

- Poor hygiene in calving environment.
- Calving difficulty, large calves, twins, still births. Note that large calves usually occur with the Holstein breed and is less in other breeds.
- Poor transition diet.

Solution suggestions

- Antibiotics.
- Post birth antibiotic pessaries.
- Prostaglandins treatment.
- Propylene glycol.
- Use sexed semen or calving ease bulls < 10% calving ease and breed for rump width above 38cm.

10. Ketosis

A severe state of negative energy balance - low energy consumption. Occurs within 2 weeks' post calving and can extend beyond this period, the demand for milk production increases substantially and the cow is unable to consume adequate energy to sustain performance. The cow mobilises body fat (Fatty acids) to maintain energy for production which overwhelm the liver. It is a result of when large amounts of body fat are utilised as an energy source to support production, fat is sometimes mobilised faster than the liver can properly metabolise it. If this situation occurs, ketone production exceeds ketone utilisation by the cow, and ketosis results.

Solution suggestions

- Glucose replacement - intravenous infusion calcium borogluconate.
- Hormonal therapy - Corticosteroids which break down proteins to release glucose
- Proper dry cow and early lactation nutrition.
- Routine diagnosis with cow side test such as Porta Beta

Hydroxy Butyrate (BHB) tests or other electronic BHB testing kits.

11. Displaced abomasum

Abomasum (fourth or true stomach) which normal lies at the bottom of the abdomen fills with gas goes at the top of the abdomen instead of being at the bottom. Displaced abomasum happens during calving/soon after calving and during pregnancy. The uterus displaces the abomasum, so that after calving the abomasum has to move back to its normal position. As a result, cow loses appetite, reduces rumination, mild diarrhoea and reduced milk yield. Poor feeding results in methane gas production that flows to the abomasum and fills to make the abomasum float like a balloon. With extra space created by evacuated calf the rise in the abomasum can also twist the intestines reducing digestive flow.

Solution - Returning the abomasum to its normal position by rolling the animal on its back and in severe cases surgery.

12. Lack of water intake

A dairy cow should consume between 60-120L per day and up to 200L for high producing cows. Lack of or low water intake is caused by;

- Fewer drinking troughs, crowding at water troughs or poor water inflow.
- Cow dominance.
- Stray voltage.
- Poor water quality dirty smelly water.
- Hard water or salts/mineral contamination.

Solution - Always provide sufficient clean water for cows and adequate drinking space.



Productive dairy cattle at Sommerset hub in Marondera

Winter Health Care

By **Walter Makombe**, a Technical Personal in Animal Nutrition and Veterinary Health.

The winter season brings with it effects of cold dry weather which can lead to detrimental loss in cattle production if not well managed. This article highlights issues to look out for in cattle health during winter so as to reduce disease incidence and unnecessary loss in profits.

By early winter, hay and other grasses will have lost green fibre which leads to a **vitamin ADE3 deficiency**. This affects the immune system leading to eye diseases such as **keratitis and bone deficiencies**. Injectable Vit ADE (Vitol ADE3) supplementation improves the response of stock to vaccines. It is important to note that, thin animals do not always fully respond to immunisations. Supplementary injections are usually done every 60 to 90 days in winter.

Since the carrying capacity of the natural veld deteriorates during drought and cold conditions, **protein supplementary feeding** is essential to maintain body condition score and support breeding cows and heifers at calving. Ensure that cows are on a rising plan of nutrition as most foetal growth occurs during this time. This is also critical for successful rebreeding results. Cattle will also browse on trees and bushes which often leads to release of tannins by the browsed plants leading to gut irritation, sickness and death. As a remedy, farmers can use Browse Plus which is a specialised formula designed as a drinking water / infeed additive, which enhances the animal digestive processes and results in more efficient nutrient utilisation. Browse Plus is included in some blocks supplemented in areas where quality and quantity of forage is limited but browse is available. Incorporation of poultry litter as a protein source in supplementary feed and/or veld grass is very common

with most farmers. Poultry litter can be a source of botulism infection in large and small ruminants. Vaccinate all stock against botulism before the winter (even if litter is not fed) as **phosphorus deficiency** in winter can induce cattle to eat bones lying in the veld which are a source of botulism infection. A daily maximum of 1kg/ animal of litter is recommended. When vaccinating take note that; vaccination doses should be according to drug label in consultation with a veterinarian; vaccines must be kept at low temperatures of 2-7 oC; not to vaccinate just before or after transporting, dipping, castration or dehorning as stress can neutralise vaccine functions.

Although anthrax can infect livestock throughout the year most outbreaks have occurred in the early winter as water levels in dams subside therefore vaccinate against anthrax well before the winter especially in the lowveld of Zimbabwe.

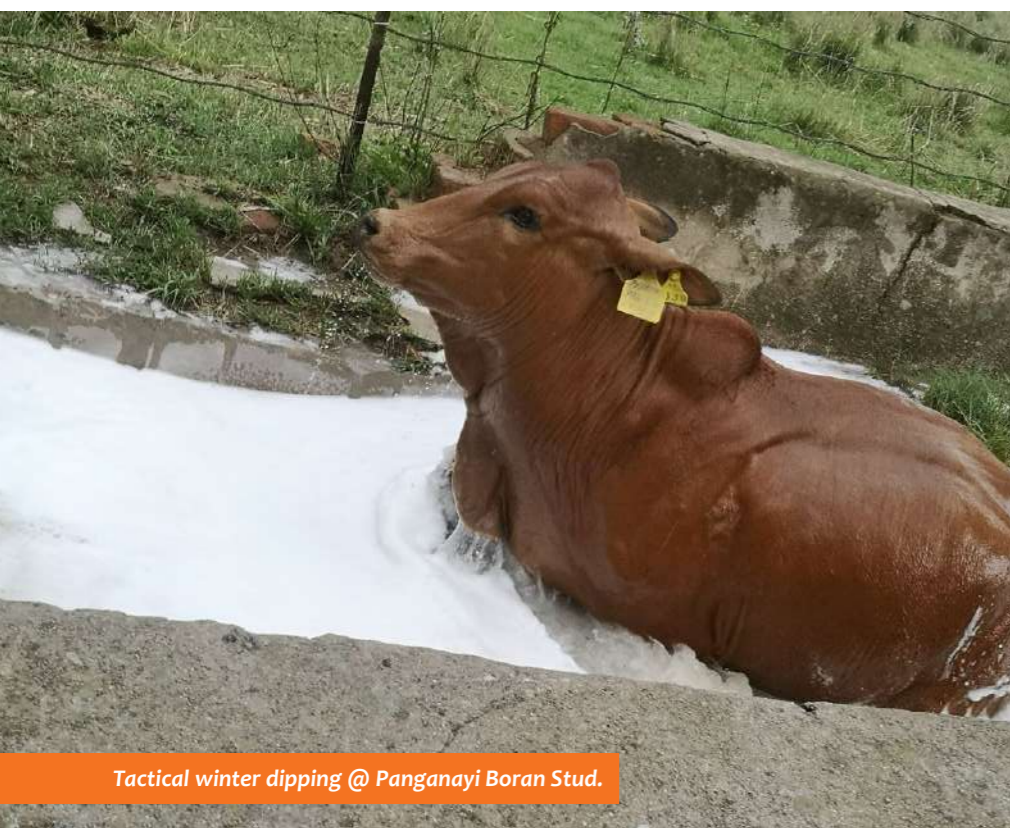
Pregnancy check cows and cull those that are open or late, have bad feet or udder, a poor temperament, cancer eye or poor joints. Pregnancy testing in cattle should be conducted by a veterinarian who will then review for current disease situation and threats, cull infertile cows/heifers and check bulls for fertility and breeding soundness before breeding. Dry, pregnant cows in good condition during the early part of gestation can be maintained on lower quality feed. Weigh calves after they are approximately 205 days old to help make culling decisions and select replacement heifers. A herd record-keeping program assists in identifying superior cows and replacement females.

Depending on tick species, infestation prevalence on the host is low in winter hence dipping is usually done fortnightly.

A very useful tip is to avoid dipping calves to control blue tick for up to 4-6 months of age during these cooler months as 4-5 months old calves are resistant to red water and gall sickness. Exposure during this period will induce a resistance to these two tick-borne diseases. **Tactical dipping** in winter reduces larval and nymphal numbers of brown ear tick thereby reducing challenge by adult ticks of theileriosis mainly in summer.

Internal parasite control is key every seasonal change. In winter, treat cattle with a long acting flukicide such as Fluconix which also controls wireworm and an anthelmintic such as Intersectin. Thereafter it is unnecessary to deworm cattle until warmer temperatures occur.

Winter management must start in autumn, this means carefully assessing body condition on your herd and developing a plan to provide sufficient nutrition to allow it to maintain moderate-to-good condition through the winter.



Tactical winter dipping @ Panganayi Boran Stud.

Agriculture Telematics Improving Farming Practices

By Car Track

Agriculture telematics is an emerging field that combines the principles of agriculture and telematics to improve farming practices. Telematics is the use of wireless communication and data analysis to remotely monitor and control assets such as vehicles, machinery, and equipment. Agriculture telematics takes this technology and applies it to farming, helping farmers to improve their crop yield, reduce costs, and increase efficiency.

The use of agriculture telematics has become increasingly popular in recent years due to the need for more sustainable and efficient farming practices. With the world population projected to reach 9.7 billion by 2050, there is a growing demand for food production. Agriculture telematics can help meet this demand by providing farmers with real-time data on their crops, soil, and weather conditions.

One of the main benefits of agriculture telematics is its ability to improve crop yield. By collecting data on soil quality, moisture levels, and other environmental factors, farmers can make



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can save money.



In addition to improving crop yield, agriculture telematics can also help reduce costs. By monitoring fuel usage, equipment maintenance, and other expenses, farmers can identify areas where they can save money. For example, if a farmer notices that a particular piece of equipment is using more fuel than usual, they can investigate the cause and make adjustments to reduce fuel consumption. Organizations like Cartrack provide such solutions.

Agriculture telematics can also increase efficiency by automating certain tasks. For example, GPS-enabled tractors can be programmed to automatically plant and fertilize crops, reducing the need for manual labor. This can save time and reduce the risk of human error.

Another benefit of agriculture telematics is its ability to provide farmers with real-time information about weather conditions. With this information, farmers can make informed decisions about when to plant, irrigate, and harvest their crops. They can also use this information to prepare for extreme weather events, such as droughts or floods.

Overall, agriculture telematics has the potential to revolutionize the way we farm. By providing farmers with real-time data on their crops, soil, and weather conditions, it can help improve crop yield, reduce costs, and increase efficiency. Furthermore by monitoring fuel usage, equipment maintenance, and other expenses, farmers can identify areas where they

As the world population continues to grow, agriculture telematics will become increasingly important in meeting the demand for food production.

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Tobacco Seedling Production

By **Dr Susan Dimbi**, Plant Pathologist/Entomologist

Tobacco seedling production takes place at a time of the year during which growing conditions, including weather, are not favourable for plant growth and this is why the production husbandry influences the quality of nursery plants.

Choice of Site - The ideal location is a warm, north or north-west facing sloping land, as it is less exposed to the sun and more protected from the cold prevailing winds in winter. A boundary fence (e.g. thatch) is recommended as it protects the site from wind and minimises incidences of ground frost. The site must have good surface drainage and an adequate, reliable water supply. The site should not be near tobacco handling facilities e.g. grading or storage sheds to avoid contamination by tobacco trash. This applies to both conventional and float seedbed sites.

1.For conventional seedbeds, fertile, well-drained sands, loamy sands and light sandy loams are the most suitable soils. Heavier-textured soils are difficult to manage for seedling production. The site should be deep ploughed early for maximum decomposition of plant residues (see ZiMunda Issue 12 – Land preparation). Irrigation to facilitate this decomposition should be done and the site should be kept weed-free. Before sowing, the site should be fumigated using products as listed in the Flue-Cure Recommendations Handbook.



A conventional tobacco seedbed in Hwedza.

2.For the float tray system, choosing a more or less level ground will make bed construction easier, but some surface drainage is also important to keep the pathways dry. The bed dimensions must be such that upon floating, trays fit snugly in the bed and no spaces are left exposed, as algae will grow in the areas exposed to sunlight. To obtain adequate, good sized seedlings for each hectare to be planted, sowing must be done on 100 - 120 m² of seedbed area if using the conventional seedbed and on 17- 20m² when using the float bed system. Five grams of seed are required for every hectare equivalent of seedbed area. The ideal seedling population is 450 - 500 seedlings/m² in the conventional system.

2

Fertilisation

1.Conventional seedbed - One kilogram of Compound 'S' (7 N: 21 P₂O₅: 7 K₂O: minimum 9 S: 0,04 B) is applied to every 7 – 11m², the higher rate being for sandy soils and the lower for fertile soils. The basal fertiliser should be carefully broadcasted and then incorporated into the upper 5 cm by a chopping action with a heavy-duty rake if a sand or grass mulch is to be used. However, if beds would be covered with either perforated plastic, plastic tents or the lightweight cover, the fertiliser should be incorporated into the upper 10 cm soil. A hoe is a suitable implement in this case. When the seedlings are 1 - 2 cm in diameter, the beds should be top-dressed with either 10 - 20 g nitrate of soda, or potassium nitrate, or calcium nitrate/m², or 5 - 10 g ammonium nitrate/m². For topdressing, the fertiliser is dissolved in water and the solution is applied just before the daily watering, which prevents the leaves from developing “fertiliser burn” symptoms. This application is repeated at least once seven days later on all late-ploughed sites and light-textured soils. Top-dressing the beds late in growth is not recommended, except when growth has been exceptionally poor.

2.Floatbeds - Two types of fertilisers are recommended: Hydrofert and Kutsaga Floatfert. Fertiliser is applied at concentrations of 25, 50 and 75 mg N/litre of water in the bed at 7, 21 and 35 days after sowing, respectively. After 6 weeks from sowing, ammonium nitrate is applied at 100 mg N/litre of water. The fertiliser should be dissolved in water before adding to the float bed at regular distances along the bed length.

Clipping Seedlings - The removal of part of the foliage slows the growth of seedlings. It is a technique for improving seedling uniformity when they are relatively small (5 - 7 cm tall). Clipping enables the smaller seedlings to catch up with the bigger ones and when clipping is delayed, it's less effective as a means of promoting seedling uniformity. Clipping may be necessary late in the seedbed phase if seedlings overgrow. Special attention to hygiene is necessary during clipping to avoid infection and spread of tobacco mosaic virus and other diseases therefore all clipping tools should be disinfected regularly.

Pest and Disease Management - Regular inspection of beds to check for pest infestations is beneficial for early detection and management of most seedbed pests. The use of yellow sticky traps (Kutsaga Gnatbuster®) is an effective monitoring tool and should be used for the early detection of an aphid or fungus gnat infestation. Growers should also look out for cutworm damage especially during the hardening period. If any pests are detected, early treatment with the recommended agrochemicals will minimise losses.

Seedling Hardening - In both seedling production systems, seedlings should be hardened for at least 14 days and preferably 28 days before planting. Hardening is necessary to impart some degree of drought tolerance once seedlings are

transplanted into the field. It also increases the carbohydrate content in the seedling and this is essential for early root development and growth. In the conventional beds, this must be done by stopping watering and only resuming when there is significant wilting before 10 am. At this point a single watering of 2-3 times the daily requirement must be done and the process repeated till pulling. In the float tray system, seedlings will naturally start to harden as soon as the fertilisers that would have been applied are used up and all nutrients are depleted. Thus, it is very important to add floatfert to the pond water as indicated in the instructions and it is advisable to always keep pond water levels at the recommended depth. Draining water from ponds will induce shock in the seedlings and may result in early flowering in them seedbed or after transplanting in the field.

The ideal seedling - Seedling from the conventional system should have a stem 15 - 17 cm long and 6 – 10mm thick, well hardened, should have produced no more than 8 - 10 leaves below them bud (including cotyledons), have a non-desiccated, strong, vigorous root system. Float seedlings are generally smaller with a stem length of 10-12 cm and about 6-8 mm diameter, however they survive better in the field because they have a more robust root system that minimises transplant shock. Uniform seedlings are critical for the production of maximum yield and quality tobacco. Left-over seedlings from an early planting are suitable for a later planting, provided they are not overgrown and free from pests and diseases.

Always plan to sow your seedbeds 90 days before the intended planting date.

For more information, growers can get in touch with Kutsaga on tobres@kutsaga.co.zw; (Twitter) Kutsaga Research; (Facebook) Kutsaga Research / Kutsaga Products and Services; (LinkedIn) Kutsaga Products and Services; (YouTube) Kutsaga Research; or (Website) <https://www.kutsaga.co.zw>



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Managing Cold Injury, Frost, Pests and Diseases

By Chinheya Cleopas, Head Plant Health Services

“Enabling your choice of variety to attain its yield potential”

A healthy tobacco seedling goes a long way to ensure a healthy tobacco crop in the field. However, cold damage, frost, pests and some diseases can cause damage to tobacco seedlings hence making their management important. Management options include a combination of cultural practices and application of pesticides and/or biological control agents.

1. COLD INJURY AND FROST DAMAGE

Cold injury is quite common for early sown tobacco seedbeds in slow growing areas. Upward leaf cupping and puckering are the main symptoms (Fig 1). The affected seedlings may be uniformly distributed through the seedbed or, more often, the injury may occur in just a few cold spots. Cold injury results more from large differences between day and night temperatures and less from a very cold night. Frost damage is more frequently associated with rapid temperature changes early in the morning. Diligent temperature management is the key to reducing cold injury, but even with the best management mild cases may occur. While cold injury sometimes slows growth, it does not result in permanent harm to the plants while frost injury most often results in complete losses.



Fig 1. Leaf cupping as a result of cold damage.

Management of cold injury and frost June-sown seedbeds particularly in frost prone areas should be grown under plastic tents. The recommended covering is UV resistant 75-micrometre gauge clear polythene sheets (Fig 2). The material, which should form a semi-circular tent or tunnel 90 cm high, will cover a bed 1,35 m wide. An easy method of supporting the cover is to use wire hoops. The hoops are spaced 1,0 - 1,5 m apart along the length of the bed and pushed into the ground as far as the loops. Two hoops are used at each end of the bed to add strength. The hoops are stabilized by a length of string that runs from hoop to hoop and is wrapped once around the apex of each. The string is kept taut and tied to stays at each end of the bed. The covers must be left on permanently for most of the seedbed phase and opened only for watering and routine sprays. On clear, hot days the ends of the covers should be opened to ventilate the beds and so avoid temperatures

above 35°C (measured with a shaded thermometer at plant level). The surface of the beds under plastic tents should be mulched in the same way as open beds, but avoid too dense a cover with grass mulch that will result in leggy seedlings. Alternatively, nappy liner may be used to reduce rapid evapotranspiration.

2. INSECT PESTS AND DISEASES AND THEIR CONTROL

The first line of defence in managing insect pests and diseases is total exclusion of the pest and disease before establishment. The following are some of the most important insect pests and diseases that the grower may encounter as well as their control measures.

2.1 INSECT PESTS

Fungus gnat (*Sciara sp.*) - Fungus gnats are mosquito-like insects, grey to black in colour, with long legs and generally clear wings (Fig 3). The larvae then burrow into the root zone, feeding on seedling roots and thereby causing poor growth, wilting, yellowing and seedling mortality in extreme cases. This is a serious pest in float beds until seedlings are at least 4-5 weeks old and pest monitoring is, therefore, of extreme importance.



Fig 3. Adult fungus gnat (left) and larvae (right). The larvae are the damaging stage of this pest, and these feed on the roots of seedlings while the adults only feed on the algae.

Scouting/monitoring the Fungus gnat

Always visually inspect floatbeds for flying adults or damaged plants. Wave a hand above the seedlings to check if an infestation has started, and if adult gnats are present, they will be seen flying off the seedlings. Because of the significance of this pest, Kutsaga developed an easy to use and inexpensive yellow sticky trap called Gnatbuster (Fig 4), for control of the pest. Since the larvae constitute the main damaging stage they can be chemically controlled by drenching with Cyromazine at the rate of 30 g/100 litres water or Imidacloprid + β cyfluthrin at a rate of 60 ml/100 litres water.



Fig 4. Yellow sticky trap for monitoring and mass trapping fungus gnat in the float system.

Cutworms (*Agrotis sp.*) - Cutworms are incidental pests which usually cause damage during and soon after hardening. Recommended insecticides should be applied, making sure that the insecticide reaches the media surface, to achieve effective control.

Leaf-miner and leaf-eaters - These include the leafminer *Phthorimaea operculella* and leaf eaters such as the lesser armyworm *Spodoptera exigua*, semi-loopers *Trichoplusia orichalcea*, Laceworm *Spodoptera littoralis* and several species of grasshoppers. Broad

spectrum insecticides such as Dimethoate and Imidacloprid + β -Cyfluthrin can be applied to control the above pests.

Aphids - In addition to direct damage through sucking, aphids also transmit virus diseases such as PVY and Bushy top which only become apparent after transplanting into lands. It is important to sow aphicide treated seed as this ensures protection from aphids for at least six weeks after sowing. However, should aphids be observed in the nursery, they MUST be controlled immediately using recommended systemic aphicides in the Flue-Cured Recommendations.

2.2 DISEASES

Pythium and *Rhizoctonia* (damping-off), *Fusarium* and *Phytophthora* are some of the soil-borne pathogens that are of importance in the seedbed. Currently, *Pythium* is one of the most serious problems in the floating tray system, and effective chemical and biological control measures are recommended. The first line of defence in any Integrated Pest Management program (IPM) is good sanitation. Sanitation - Sanitation is of paramount importance (Fig 6) and the following must always be adhered to.

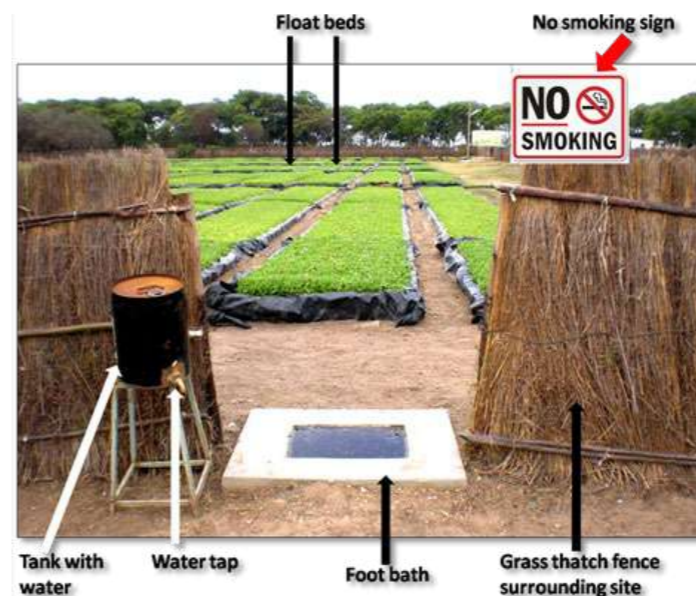


Fig 6: A single entrance to the site, with foot and hand sanitizing equipment.

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Pythium root rot - Seedling root rot, caused mainly by *Pythium myriotylum*, is one of the major challenges in the floatbed seedling production system. Symptoms of the disease include yellowing of the leaves, wilting and rotting of the roots (Fig 7). Fungicides such as metalaxyl-m + mancozeb, fenamidone + mancozeb, strobilurins and strobilurins + triazoles should be applied as preventatives from 3 weeks after sowing or as curatives after the disease has already established.



Fig 7. *Pythium* root rot leaf symptoms (left), and roots become brown and slimy (right) before the leaf yellowing symptoms appear

Rhizoctonia solani damping-off of seedlings – sore shin - This is a problem in both the float and conventional seedbeds. Seedling deaths are observed during the very early stages of seedling growth, around three to six weeks after germination. The first symptom is a small water soaked lesion on the stem base that rapidly becomes brown and sunken. The lesions constrict the stem and stems break-off (Fig 8). Lesions continue to grow throughout the stem and leaves causing them to turn brown and die, and unlike in the case of *Pythium* damping-off, seedlings usually die without the leaves first yellowing and the root system can remain clean and intact with only the base of the stem turning brown. The problem is aggravated by high temperatures and high humidity, and if no corrective measures are taken, seedling mortality can be severe.



Fig 8. Sore shin (*Rhizoctonia solani*) infection in the seedbeds. Disease development and early symptoms (top left and right), and later infections on older seedlings (bottom left and right).

A biological control agent, *Trichoderma harzianum*, can be used for the management of seedbed pathogens, and this is available from Kutsaga. The fungus must be incorporated into the growing media for floatbeds or into the ground for conventional seedbeds. It can also be applied as a drench after seedling emergence.

For more information, contact Kutsaga Research Station's Plant Health Services Division VOIP 0868 800 2604 or Email: cchinheya@kutsaga.co.zw



AGRONOMY

Guard Your Yields Jealously

By **Dr Nyasha Chiuraise**, Plant pathologist, SeedCo Ltd and Wendy Madzura, Head of Agronomy, SeedCo Ltd

Grain pests are any live insects that feed and damage harvested stored grain. These include grain weevils, grain borers and grain moths which cause damage to grain such as maize, soybean, wheat, barley, rice, sorghum, common bean, millets and cowpeas.

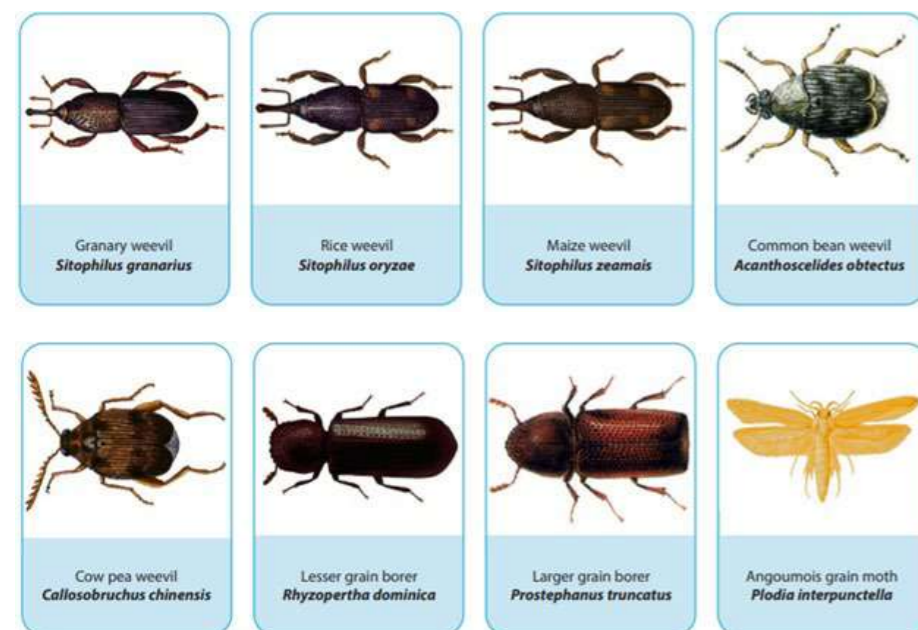
Examples of Grain Pests

The majority of stored grain pests belong to the order of Coleoptera and Lepidoptera that accounts for 60 and 10% respectively. Coleoptera which means modified front wings that serve as protective covers for the membranous hind wings is an order of insects that includes beetles. Examples of includes granary weevil (*Sitophilus granarius*), Rice weevil (*Sitophilus oryzae*), Maize weevil (*Sitophilus zeamais*), Common bean weevil (*Acanthoscelides obtectus*), Cowpea weevil (*Callosobruchus chinensis*), Lesser grain borer (*Rhyzopertha dominica*) and Larger grain borer (*Prostephanus truncatus*). Lepidoptera which means 'scaly wings' is an order of insects that includes butterflies and moths, examples include Angoumois grain moth (*Plodia interpunctella*) Figure 1.

also cause contamination by the production of enterotoxins and mycotoxins that can be harmful to human health. Hence the loss caused by insect pests is not in terms of quantity but mostly in terms of quality. Qualitative loss in stored grain is caused by chemical changes in proteins, carbohydrates, amino acids which negatively affect the nutritional value of grains.



Prevention Measures and Control Chemicals



Images of the most important grain insects

Economic and Nutritional Damage of Grain Pests

Insect pests possess a major threat to grain production and are also responsible for both direct and indirect losses of grain both in the field as well as in the storage. Pre-harvest losses are estimated to be 15 -100% and between 10 - 60% post-harvest losses of stored grains. Stored grain pests generally feed on grain, bore into the kernel and then destroy the germ portion, cause heat and then cause deterioration in stored grain products thus resulting in huge losses mainly due to nutritional depletion, seed germination viability and reduction in market value. Grain pest damage

The combination of meticulous grain hygiene plus well-managed aeration cooling generally overcomes 85 per cent of storage pest problems. For grain storage, three key factors provide significant gains for both grain storage pest control and grain quality – hygiene, aeration cooling and correct fumigation. Fumigants containing aluminium phosphide, such as Phostoxin tablets can be used to fumigate grain in a tightly sealed containers, silos or rooms. Caution should be taken when working with Phostoxin tablets as they are extremely toxic to humans and livestock. For short grain treatment required for human consumption, a less toxic powder treatment of Actellic Gold Dust (Pyrimiphos-methyl + Thiamethoxam) can be mixed with grain in sacs/bags to control weevils and borers. For long term storage of seed not meant for human and livestock consumption, potent chemicals such as Malathion and Carbaryl are used for control of a wide range of insects.

Prevent, Monitor, Detect and Remove - Resolving pest issues as quickly as possible will be beneficial in the long run, as infestations are naturally more difficult to remove. Being proactive while working on a pest management program will help prevent pests and protect your products, business and bottom line.

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Elatus™ Arc	Fungicide	Barley Wheat	Net Blotch, Leaf Rust, Scald, Powdery Mildew, Ramularia Leaf Blight in Barley ; Septoria Leaf Blotch, Brown Rust, Yellow/Stripe Rust, Powdery Mildew, Glume Blotch, Tan Spot in Wheat .
Miravis® Duo	Fungicide	Cucurbits Peppers Potatoes Tomatoes	Early Blight in Tomatoes and Potatoes ; Powdery Mildew in Tomatoes, Peppers and Cucurbits .
Orondis® Ultra	Fungicide	Cucurbits Tomatoes	Late Blight in Tomatoes ; Downy Mildew in Cucurbits .
Flex®	Herbicide	Beans Groundnuts Soyabeans	A selective post-emergence herbicide for the control of annual broadleaf weeds in soyabeans, dry beans, green beans and groundnuts .
Engeo®	Insecticide	Tobacco Tomatoes Vegetables (Brassicas Onions, Garlic, Peppers, Chillies, Okra)	A contact and systemic insecticide for the control of aphids in tobacco and vegetable crops , cutworm and budworm in tobacco lands, fruitworm and whiteflies in tomatoes , thrips in vegetable crops .
DenimFit®	Insecticide	Brassicas Maize Peppers Potatoes Tobacco Tomatoes	A broad-spectrum insecticide for the control of lepidoptera insect pests (Fall Armyworm, Budworm, Tuta, Diamond Back Moth, Tuber Moth, Bollworms, Leafworms) in maize, tobacco, tomatoes, brassicas, peppers, and potatoes .

RADIAL Communications 1867

Wheat Irrigation in Winter 2023

By Langton Mutemeri, Research Manager at Agricultural Research Trust

The best soils for wheat production are deep, heavier textured soils with a good organic status. However, it is possible to grow wheat on a wide variety of soils if they are well-drained. Irrigation management and fertilisation practices must be of a high order to obtain economically viable yields on lighter soils. It is advisable to avoid poorly drained, badly aerated soils as wheat is susceptible to water logging. Wheat roots under ideal conditions can penetrate as deep as 1200 to 1500mm. The soils chosen must be in good health biologically, physically, and mechanically with a pH reading ranging from 5.0-6.0 pH (CaCl₂) on sands and 5.3-6.3 on red clay loams and clays.

The farmer must plan to determine water resources, land availability, pipe layouts, and the minimum cycle length required. The method of irrigation scheduling to be used must be decided upon before you plant the wheat. Make sure your irrigation equipment is in good working order and maintain it as such throughout the season. In particular, check for leaks, sprinkler function, and correct nozzle size. It is a clever idea to replace nozzles annually. Keep to design specifications on pressures, spacings, and layout.

Germination irrigation - When applying your germination irrigation, make sure that by the time the wheat emerges, or at the very latest at three weeks, the soil must be at field capacity down to the potential rooting depth, which may be 1.5m on deep soils. This is important because any dry layers in the soil profile will impede root development and crop growth. After the germination irrigation at day, zero apply light irrigation of 22mm between days 4 and 7 to moisten the soil surface to facilitate emergence. The next irrigation is applied about 21 days after the first germination irrigation when the wheat plants start to develop crown roots and tillering. At this stage, light irrigation of no more than 22mm is required to recharge the topsoil.

Irrigation Scheduling After Sowing - After this irrigation, you then stress condition your crop up to day forty after sowing when you apply full irrigation of 44mm on heavy soils and



below 30 mm on light-textured soils. At this stage, you then start your irrigation scheduling. Irrigation scheduling is a key component of successful wheat farming and involves the forecasting of water application for optimal crop production. The scheduling method may be complex or simple, but whatever approach is taken it must fit into the farming system and be appropriate to the broad objectives of the farmer. Proper irrigation is necessary for the efficient use of water, and all other necessary inputs. The benefits of proper irrigation scheduling include improved crop yield, water conservation, and low production costs. The use of an evaporation pan and scheduling graph will assist you in evaluating when to irrigate, and how effective your irrigation is in maintaining the desired soil water balance. In-field checks of the soil water content with an auger throughout the season will also help you evaluate your irrigation regime. Auger ahead of and behind the irrigation line to check if the cycle is due and behind to check the effectiveness of water application.

The Irrigation Cycle - The simplest form of irrigation scheduling is to set the cycle length at the start and maintain that throughout the growing season. On heavy soils, after day forty irrigation maintain a 12 to 14-day cycle applying 44mm, and on light textures, soils maintain a 7 to 9-day cycle applying less than 30mm depth of water. The centre pivot applies less water of about 22 mm with cycle intervals of between 5 – 7 days. Another simple method is to schedule irrigations at particular growth stages, For the highveld these are.

Germination and emergence.

Crown root development and tillering (3-4 weeks).
The appearance of the first node and start of shoot elongation (6-7 weeks).
Booting and flag leaf emergence (9-10 weeks).
Ear emergence and anthesis (flowering at about 12 weeks).
Grain filling from 13-14 weeks.

These growth stages occur earlier in the middle and lowvelds, and the timing may vary depending on the variety grown. If



a manager kept strictly to irrigating only at these growths, stages it is likely that the plants would undergo some stress, and yields may be adversely affected. Again, this method gives no information on the soil water status.

Simple soil water budgets can be calculated from estimates of potential evaporation and crop factors. Crop factors or E_t/E_o represent the ratio of crop water use (E_t) to potential evaporation (E_o) and varies through the season with the crop growth stage. For a given day, the crop water use can be calculated by multiplying the daily evaporation with the appropriate crop factor. This daily crop water use can then be cumulated from day to day and irrigation applied when the total crop water use equals the irrigation application of a convenient set time. This method can use either historical or current evaporation data. The problem with these figures is that they are averages of averages and therefore do not allow for extremes when used on a daily basis. Nevertheless, in the absence of current evaporation data, they can help farmers schedule irrigations; and has the advantage that the schedule can be prepared at the start of a growing season.

Example:

Site;	Kadoma
Wheat planted	15 May.
Date of observation	10 July
The growth period is	8 weeks after planting.
$E_o =$	4.5 mm
E_t/E_o ratio =	0.8
Water use by plant	$4.5 * 0.8 = 3.6$ mm/day
Scheme design to apply	44 mm NET.
Period between irrigation =	$44/3.6 = 12$ days

Therefore, during this period, the interval between irrigations is 12 days. A new figure will have to be calculated between each irrigation and from month to month. As mentioned before, the main drawback of this system is that it does not consider daily variations in weather conditions.

The current Evaporation Data method employs the evaporation data recorded from a Class A pan located in the appropriate situation. Using the Pan Deficit Graph method simplifies the calculations and only requires the daily evaporation to be entered into a specially prepared graph. The daily readings are accumulated until they reach a pre-determined line on the graph which acts as a trigger for irrigation application. These graphs are supplied by the CFU

crops division and are specific for three factors; **Crop**, **Region** - low, middle, or highveld; **Amount** of net irrigation application.

During Grain Fill - At least one irrigation should be applied during the grain-fill period (i.e., after flowering). It is preferable to apply two or more irrigation during grain filling. However, there is no point in applying irrigation once the crop has begun to yellow, and the grains are fully formed and doughy. If the crop is still green, and you have the water, it will pay to irrigate, if there is an evident change in colour of the peduncle from green to yellow stop irrigating. A wheat crop requires 4 to 5 mega litres of water per hectare per season.

It will be helpful for future reference to keep records of how you irrigated your wheat crop, and what the results were like. Aim to do better with each crop. Minimise deep percolation below the root zone on sprinkler-irrigated fields by applying water according to crop evapotranspiration and soil moisture status. Also, minimise surface runoff and increase uniformity on sprinkler-irrigated fields by decreasing application depth or by changing nozzle and pressure configuration, height, or droplet as appropriate. Maintain sufficient residue to reduce overland water flow and increase moisture intake rate. Where practical, follow soil conservation practices such as minimum tillage to reduce soil erosion of soil sediments containing nutrients or pesticides. Test systems periodically for depth of application pressure, and uniformity.



ART Farm Open Day

By Rob Jarvis

The Agricultural Research Trust's (ART Farm) annual Open Day was held on the 30th of March and provided a great opportunity for farmers, trade and general public to get together in the autumn sunshine. ART's crops were looking a picture with high yielding maize and soya beans grown alongside vegetables, potatoes, sorghum, millet, sunflowers and many other crops. There is no doubt that ART Farm continues to provide a World-Class Field Testing facility to thoroughly investigate new varieties, products, equipment and management methods

Essentially the day allowed co-operators working on ART Farm to showcase the work, products and services they offer with a field tour on tractors and trailers, followed by the chance to network and get lunch and have a drink in cool shade surrounding the Auditorium.

Of particular interest to farmers is the increasing number of products and opportunities to use biological products to replace traditional synthetic fertilisers and pesticides/fungicides. Interaction with experts was possible in the shade where modes of action, target pests and diseases and

barley, and soya are all tested by ART in their countrywide programme. Independent testing of new hybrids/varieties of all the major crops is a pre-requisite for release of the variety through the National Crop Variety Release Committee.

Many farmers were interested in the new maize products of the various seed companies and seen above is SeedCo's top scientist Gordon Mubaye showcasing his company's most recent release in the long-season white maize category. This particular hybrid SC 729 is high yielding both as a grain crop and for use in silage production for dairy farmers. ART Farm provides an invaluable service in the country's agricultural sector, testing as many as 90 maize hybrids annually in a series of trials grown through the country where they are compared to commercial standards. Winter wheat, barley, and soya are all tested by ART in their countrywide programme.

Independent testing of new hybrids/varieties of all the major crops is a pre-requisite for release of the variety through the National Crop Variety Release Committee. Many farmers were interested in the new maize products of the various seed companies and seen above is SeedCo's top scientist Gordon



ART's Langton Mutemeri, Head of Research and Darryl Edwards of Pfumvudza (See ZiMunda issue 8 – an article on Pfumvudza).

Tractor-drawn trailers, with wheat straw bales for seating is the traditional method of getting around any sort of field day in Zimbabwe and ART Farm is no exception. After a few stops it is only the young and nimble who jump on and off to intermingle with the crops experts at ground level.

ART is increasing its level of interaction with players in the agricultural industry with Foundations for Farming, taking up a whole block to showcase their Pfumvudza concept to the general public. ART's Langton Mutemeri, Head of Research and Darryl Edwards of Pfumvudza explained the plots dedicated to this activity. The demonstration on ART is designed to go full circle with annual rotations and cover crops built into the mix and it will be a long-lasting

demonstration of what can be done to make farming families, in countries like Zimbabwe, totally food self-sufficient.

ART is also continuing the work started two seasons ago whereby various cover crop mixes are investigated with cattle grazing routines and crop rotations to determine the best way forward for row-crop farmers looking at regenerating their farmland. Below, Sandi Roberts is seen explaining the work being done on ART with the summer cover crop in this case.



effectiveness of product could be explained. There were new products on offer that can help crops to "stay-green" and thereby push yield potential to new heights.

Many farmers were interested in the new maize products of the various seed companies and seen above is SeedCo's top scientist Gordon Mubaye showcasing his company's most recent release in the long-season white maize category. This particular hybrid SC 729 is high yielding both as a grain crop and for use in silage production for dairy farmers. ART Farm provides an invaluable service in the country's agricultural sector, testing as many as 90 maize hybrids annually in a series of trials grown through the country where they are compared to commercial standards. Winter wheat,



Mubaye showcasing his company's most recent release in the long-season white maize category. This particular hybrid SC 729 is high yielding both as a grain crop and for use in silage production for dairy farmers. ART Farm provides an invaluable service in the country's agricultural sector, testing as many as 90 maize hybrids annually in a series of trials grown through the country where they are compared to commercial standards. Winter wheat, barley, and soya's are all tested by ART in their countrywide programme.

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Sheep Dog Trials

By ZiMunda Farming and the Sheepdog Association of Zimbabwe

The Sheepdog Association of Zimbabwe (SAZ), consists of a small but determined group of people whose numbers are starting to grow again. It was inaugurated in February 1992 and falls under the umbrella of the Zimbabwe Kennel Club but also has its own rules and regulations.

What are Sheep Dogs?

A sheep dog is a type of dog that either has been trained in herding or belongs to breeds that are developed for herding. All herding behavior is basically modified predatory behavior and through selective breeding, humans have been able to minimise the dog's natural inclination to treat cattle and sheep as prey while simultaneously maintaining the

to understand that a working dog cannot just be bought and be expected to perform a job. It takes many years of work on the part of the handler to learn how to harness the natural ability in a dog and become the team that is necessary to be successful. The main aim with using a dog on stock must be for the better welfare of the stock. An untrained or badly trained dog will often do more harm than good.

Are Border Collies the best shepherding breed? Yes! Sheep herders all around the world agree that no other breed compares to the Border Collie. Some of their traits include;

- They have their own special herding move called “the eye”, an intense stare fixed on the sheep to intimidate them.
- Border Collies have their own style of herding called “gathering style”. Their handlers stand still and direct their dogs using verbal commands and a whistle. In traditional style, handlers move with their dogs.
- The Border Collie has been named one of the smartest dogs in the world holding 17 Guinness World Records! In January 2021, 2 Border Collies, Wish and Halo, set the Guinness World Record for most tricks performed in one minute.

Note to the Public: We would like to very strongly emphasise to the public not to buy a border collie, or any other dog, advertised on any social media platform. Unfortunately, there are many unscrupulous people worldwide, including in Zimbabwe, who are running or obtaining puppies from puppy mills. If you cannot verify the credentials of a person through a registered body or see the parents with your own eyes DO NOT believe what you are told and DO NOT support this cruel business.

The Current Situation in Zimbabwe

In Zimbabwe, the sheep farming situation is very different from the huge flocks that are found in South Africa and Australia, or in smaller family enterprises found in other parts



On the course

dog's hunting skills, thereby creating an effective herding dog. The American Kennel Club (AKC) lists 30 breeds in its Herding group and these include breeds such as the Catalan Sheepdog, Polish Lowland Sheepdog, Border Collies, Australian Shepherd and Pembroke Welsh Corgi. The interest for SAZ members is the Border Collie which is believed to have been a sheep dog since the late 1700. In a 1790 book (one of the first references to the Border Collie), titled General History of Quadrupeds, by English engraver Thomas Bewick, he states that, “If the herdsman be at any time absent from the flock, he depends upon his Dog to keep them together; and as soon as he gives the well-known signal, this faithful creature conducts them to his manner, though at a considerable distance”. The book includes an engraving of a shepherding dog that's similar in appearance to the modern Border Collie.

This and the Kelpie are the main dogs capable of competing at the international level of sheepdog trialing. Just because an animal is a border collie or kelpie does not make it a good working dog. Genetic working lines are very, very important and play a major role in how successful a working dog is as, over the years, these dogs have been bred for many other disciplines or bred without proper care and attention to working ability and working temperament. It is paramount



Representatives from Montego, our sponsors, enjoying the runs.

of the world. Traditionally in Zimbabwe, sheep rearing have been a sideline to cattle ranching, but the situation seems to be changing as many people are now looking at what can be done more intensively on smaller areas of land. Not all the members of SAZ that run dogs are able to own their own sheep nor do they have a suitable training area and so, there are frequent training get together at some of the members farms! Traditionally, it was shepherds and farmers who were the only people skilled to handle the dogs. Today there are a lot more people from varying backgrounds becoming involved with sheepdogs.

Around the world many sheepdog trials are held but one of the most prestigious trials is the Sheepdog World Trial which is generally held every 3 years and is the sheepdog equivalent of the Olympics. The latest trials are being held in Northern Ireland in September 2023 and, for the first time, Zimbabwe has been invited to participate! We have been issued 2 spots and there will be a team of 2 handlers and their dogs that have met the qualifying criteria attending.

March Sheep Dog Trials

In March over a span of 4 days, SAZ held trials under three levels; beginners, juniors and top dogs at sheep farms on Enterprise Road and in Ruwa. The dogs on trial were judged by Mark Trollip from South Africa who is part of the South African team for the World trial and sponsored by Montego to whom the Association is grateful.

Attending sheep dog trials can certainly assist a new handler, by watching experienced handlers working their dogs, reading how the sheep react to the dogs, understanding the breeds of sheep used at trials and how they differ is all so important. At this event during short speeches by the judge, beginners picked up pointers such as;

- Not to start training too early. A common mistake trainers make is to assume a puppy can be trained for herding from a very young age.
- To only train for 15 minutes at most at the beginning.
- Start small. There are maneuvers such as the outrun (which is the course the dog takes to get behind the sheep, the correct pattern is like half a pear), the fetch (which is the dog

bringing the sheep to the handler), driving (herding the sheep away from the handler which is not natural for a sheep dog, its instinct is to bring the sheep to the handler), the get backs out (go off and herd in a stray cluster of sheep) and to pen the sheep (to drive them into a pen).

- Take advantage of the dog's instincts and build on them.
- Pay attention to body language.

The aim of the Association is the better welfare of stock, to encourage new members, promote the sport as well as educate the public as much as possible about the working dog. The help of a well-trained sheepdog is of huge value in a farming enterprise and the sport is one that is open to young and old.

There is always lot to learn at sheep dog trials and trainings, for both the handler and the dog, if interested please contact the Sheepdog Association of Zimbabwe on email rosevdr@gmail.com

Away	Generally used for a right-hand command.
Come Bye	Generally used as a left-hand command.
That'll Do	A common recall command which has been used for hundreds of years by shepherds. The dog is being asked to stop what it is doing and return to the handler.
Stand	Asking the dog stop, stand and wait for the next command, some handlers use the word 'Stop'.
Walk On	Asking the dog to walk on to the sheep in a calm steady manner, some times 'Walk Up' and 'Get Up' are also used.
Lie Down	Generally used to get the dog to stop and lie down in front of the sheep, staying there until the next command is given.
Steady	This is used to get the dog to slow down, which in turn creates distance between the dog and the sheep. Reducing the stress on the sheep by the presence of the dog.



Cooling off after a hard run

Winter Care of Piglets

By Yolanda Dehwe, Piggery Section Supervisor

The Zimbabwean winter months from June to August are mostly characterised by warm, dry days and extremely low temperatures (down to less than 20°C) at night. It is vital that pig farmers prepare for this drastic change in weather way before the onset of the winter season. This is especially true for small-scale farmers whose pigs are frequently kept outside or in inadequately heated shelters.

It has been noted that often at times a lot of attention and focus is directed at minimising heat stress in pigs as they lack sweat glands whilst the management of piglets during colder periods is neglected. It is widely believed that pigs are quite tolerant to colder conditions compared to other animal species as they have a thick layer of fat underneath their skin. However, the lack of fur especially in young piglets makes them more susceptible to cold conditions. This means that extra supply of warmth is imperative.

COLD STRESS

Cold stress is experienced when the pig's core temperature falls below the thermoneutral zone (TNZ). The TNZ is an environmental temperature range that allows the pig to prioritise feed nutrients for building meat or reproductive tissues. In this range the pig will be able to maintain its normal body temperature.

The young piglet is born wet, hairless and with very low energy reserves. Without warmth the piglets will become lethargic, less competitive and more prone to starvation, disease and death. It is therefore essential that sufficient and complementary, if necessary, heat sources should be provided for the piglets.



Extreme cold conditions have many detrimental effects on the piglet. These include;

- Health problems which arise as a result of damp and moist conditions within the pig housing;
- Lower growth rates;
- Poor pig performance; and
- High mortality rates.

Harmful results of chilling also include poor feed efficiency, loss of body fat, greater susceptibility to diseases such as scours and pneumonia, higher mortality and even an

increase in tail biting. Investing in proper housing facilities can minimise the impact of cold stress in piglets. A farmer must be well informed and equipped to be able to fully understand the piglet behaviour indicating cold stress.

SIGNS OF COLD STRESS

1. Sleeping behaviour/ pattern - As a pig farmer, you must be cautious to the sleeping patterns and behaviour of the piglets. It is a surest way of assessing the thermal state of the pig housing. Huddling may be defined as a state where a pig is lying with more than half of its body in contact with another pig. The piglets may be lying on top of each other. When the piglets are huddling, lying with their feet tucked beneath them is a sure sign of discomfort due to cold. The tucking in behaviour reduces the surface area of skin exposed to the cold.



2. Shivering - This is probably the easiest and simplest way to indicate cold stress in pigs. It is a muscular thermoregulatory behaviour which indicates cold stress in piglets. Shivering is usually a slow and irregular vibration of any body part, or of the body as a whole due to muscle activity in response to cold. The shivering is a metabolic response to attempt to increase the body's heat production. The piglets do this to adapt to the drop in environmental temperature. Visually examine the selected group of animals and estimate the percentage of pigs that are shivering. If the number of piglets showing shivering behaviour exceeds 20% the farmer should know that the temperatures are too cold for the piglets.

3. Sleeping in waste material - When cold, piglets tend to lie on faeces and urine as these provide a temporarily warm sleeping area. However, this exposes the young animals to diseases.

•Other signs to look out for include snorting/coughing and changes in skin colour.

HOW TO PREVENT COLD STRESS IN PIGLETS?

There are various strategies that the pig farmer can employ to minimise the impacts of cold weather in piglets and these include;

1. Provide adequate shelter - This will ensure that your piglets are protected from any abrupt drops in temperature.

The buildings should be well ventilated and allowing dry air to circulate. All entry points for drafts should be closed or repaired. Avoid material made of steel, aluminium or concrete. For pigs that are housed outdoors, one must provide nesting and farrowing space in a shaded area because neonates are more susceptible to the cold weather compared to other young animals. Cheap sources of material such as plastic boards and plywood can be used as a covering for the shelter for farmers using open pens. A hole can be made on the top and an infra-red lamp put through it.

2. Supply deep bedding - Bedding in the form of straw can be supplied to the piglets to minimise heat loss from their bodies. Make a deep layer with the hay or straw to provide better insulation to the piglets. Cheaper sources of bedding such as wood and shavings can be used as they are a more absorbent layer of insulation. Barley shavings, sand or old



pieces of cloth can be used as extra bedding for the piglets if one has access to these. When supplying straw, be sure to avoid any type of bedding that may cause skin irritations to the young piglets. The bedding should be changed regularly when it gets soiled or wet.

3. Ensure adequate ventilation - The common misconception is that completely covering pig housing will help minimise heat loss. This is to some extent true although if mismanaged it can lead to microbial build up.

4. Provide extra heat sources - Keeping piglets warm is critical to maintaining health and achieving early growth. For very young, low-weight piglets up to three days old, there is also the threat of hypothermia. Temperatures of up to 34 degrees may be necessary to keep these vulnerable piglets alive. Farmers can use charcoal burners or infra-red lights. Infrared lamps are relatively cheap and widely available. As shown in the picture provided the lamp can be reinforced with a wire gauze to guard the bulb and prevent damage to it.

It is very essential that farmers prepare for the coldest time of the year in order to minimise losses from the impacts of cold stress as highlighted in this article as new-born piglets are extremely vulnerable and more susceptible to cold stress. Hence the farmer has to ensure that they provide a warm environment for the piglets so that they can perform optimally.

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Sustainable Utilisation of Wild Resources

By **Lorraine K Salimu & Milton T Makumbe**, Fisheries and Aquaculture Resources Production Department (FARD)



Crocodile farming is a million-dollar industry contributing immensely to the aquaculture sector, conservation and socio-economic development of Zimbabwe supporting over 1500 employees with an average of 6 dependants. Zimbabwe is a major producer of the *Crocodylus niloticus* (Nile crocodile) bred for their meat and skin which is largely exported. Although the nature of the business is characterised by high start-up and maintenance costs, the returns are favourable, and farmers are guaranteed to produce 30 good quality skins per annum from 100 mature animals within 5 years. The money-making product is the skin, exported to tanneries and high-end fashion houses in

Europe and East Asia. The market is very discerning and demands extremely high-quality skins resulting in the producers employing strict management protocols to meet the customer requirements. Markets and farmers determine production techniques and management whilst also demanding environmental sustainability, corporate social investment, and traceability. If one is keen, patient, and passionate about the business, starting up a crocodile farming business requires key knowledge for the success of the venture.

Crocodiles are wild animals and the commercial utilisation of their products on the international market requires licencing. The generation of a sustainable income from a wild resource is the underlying principle of conservation through utilisation. This was the basis for the development of the crocodile industry and one of the reasons Zimbabwe's populations of Nile Crocodile was down listed to Appendix II of CITES, thus opening trade in the species. Hence, whilst the farming is open to everyone, sale of crocodile products is strictly regulated. To be well versed in the business it is essential to have a hands-on experience on other successful operational farms within reach. It is important to learn the raising systems, handling, advantages, and the disadvantages of running the farm before committing to the business.

Selection of a suitable site is key to operations and has a large bearing on operational costs if not strategically done. An area where wild crocodile populations naturally occur will likely increase breeding and growth as conditions would be favourable. An efficient transportation system will be

required to cater to on-farm emergencies and transportation of wild eggs if one is not a breeder. The fragility of the eggs begs for quick transportation to ensure hatching success rates are high. The enclosure requires the right dimensions, thus as a standard rule of thumb, the enclosure width and depth should be three to four times the animal's total length although larger sizes are preferable. A **grow-out pen** can be used for both grow-out and nursery with an ideal grow-out building occupying 20 square metres. There is need for multiple pens to cater for different age groups. Construction materials vary from wood, concrete, to metal and all should be thoroughly insulated and rest on a concrete foundation with temperatures maintained at 30°C to 32°C. Hot water pipes, and/or electric heating coils can be utilised for this.

The foundation of good quality skin in crocodiles stems from appropriate and high-quality feed. Administration of fresh food is always a must. Crocodiles are carnivores and cannibalistic which serves as an advantage for a frugal farmer aiming to cut production costs. After mature crocodiles are slaughtered for skins, only 10% of meat is sold on the market due to low popularity among consumers. Excess meat is recycled back and fed to other crocodiles posing no health risk to the crocodiles. Other sources of protein include beef, chicken, fish, and horse meat fed at conservative rates of 25% body weight of feed per week for first years. This is cut to 18% body weight per week at three years. Adhering to these feeding rates ensure the crocs are not overfed, risking development of gout. Crocodiles reach maturity at 3 years with females likely to lay between 30 to 45 eggs once a year.

Breeders tend to realise profits from the sell of eggs ranging an average of US\$30 each.

Animal health is also an imperative aspect to high productivity thus care is very important when handling the animals reducing stress. A stressed crocodile is highly likely to develop brown spot disease which results in the discolouration of the skin and has detrimental effects on its value on the market. Reduce noise disturbances in the area and do not over crowd the animals. Ensure pens are cleaned on a regular basis taking care not to agitate the animals before, during, and after feeding. Excellent management practices are guaranteed to make crocodile farming a success, and worth the effort and investment.



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TIMB Blocks 448 Grower Numbers on Strong Suspicion of Tobacco Side Marketing

By the Tobacco Industry & Marketing Board (TIMB)

As of the 6th of April, 2023 we at TIMB has blocked 448 grower numbers on strong suspicion of tobacco-side marketing. We interrogated the tobacco selling system, according to sales points, looking for irregular activity that strongly indicates the illegal practice and these growers are the alleged offenders.

The blocked grower numbers had sold tobacco five times or more in only 13 days of the 2023 tobacco marketing season. It is illogical and cost-ineffective to bring 20 bales to market on a Monday then bring 10 on Wednesday and 15 on Friday the same week only to bring similar amounts of tobacco in the following week.

Such sales behaviour is typical of tobacco farmers who sell tobacco on behalf of their peers or illegal tobacco buyers who buy the golden leaf from farmers at low prices only to come and resell it at auction or contract floors at a higher price.

We have blocked these growers from making more sales to make sure we only have legitimate tobacco farmers selling. The individuals with blocked grower numbers should approach TIMB with their sales sheets, and verify that they are legitimate tobacco growers selling their own produce. We will also send our technical team for farm visits to verify by physically inspecting the respective farms and if they are legitimate growers we will unblock their grower numbers.

Side marketing is when tobacco growers sell their tobacco to third parties in breach of the contractual agreement that tobacco shall only be sold to or bought by the contractor who provided inputs to the grower. It is also when an individual sells tobacco on behalf of another.

It is sufficient to mention that side marketing can be perpetrated by either a farmer, an unlicensed buyer or an errant licensed contractor. This criminal practice is responsible for the loss of millions of dollars annually and has the potential to kill the tobacco industry.

This year, 2023, we are on an accelerated drive to ensure orderly tobacco marketing and end tobacco side marketing. We are armed with SI 77 of 2022 as well as the Contractors' Compliance Administration Framework as our main tools to fight side marketing and there will be no sacred cows and unturned stones.

All tobacco stakeholders are mandated to fully utilise the TIMB booking system. A grower should book their tobacco for sale in advance. This helps us detect side marketing and stop it.

We have also extended the arm of our Inspectorate department, they will be conducting random inspections of farms, sales floors and warehouses throughout the season.

Our Inspectors will also conduct intelligence-led operations in partnership with law enforcement agencies for example surveillance patrols and stops and search at roadblocks.

WWW.ZIMUNDA.CO.ZW



As a Board, we continue to educate and carry awareness campaigns targeted at all tobacco industry stakeholders so that they know the implications and negative effects of side marketing and invite whistle-blowers to give us anonymous tip-offs on our toll-free number 0774 075 045 or any of our online platforms.

We encourage all players in the tobacco industry including licensed contractors to be honest stewards of the industry, varimi/ macontractor akavimbika, abalimi / amacontractor athembekileyo.

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Cultural Transformation at Farms

AGRI-BUSINESS

Dear Young Farmer,

I was pleased to learn that you are taking an active role in farming and your efforts in transforming it into a commercial entity. Remember, *70% of transformations fail, and the main causes are culture/people issues.*

I mention the disheartening statistic because the challenges that you are facing such as increasing client complaints, financial losses, pilferage, damages to assets and death of livestock due to negligent handling and high turnover of top talent are not only due to lack of systems, money or training. The back biting, petty fighting, lack of communication and planning, and the inability to work together are the symptoms of a *Toxic Farm Culture.*

“Culture eats strategy for breakfast”

-Peter Drucker

Before you roll your eyes, let me explain. Farm culture deals with beliefs, traditions, assumptions, and norms of behaviour that are particular to your enterprise. It is a huge factor in determining

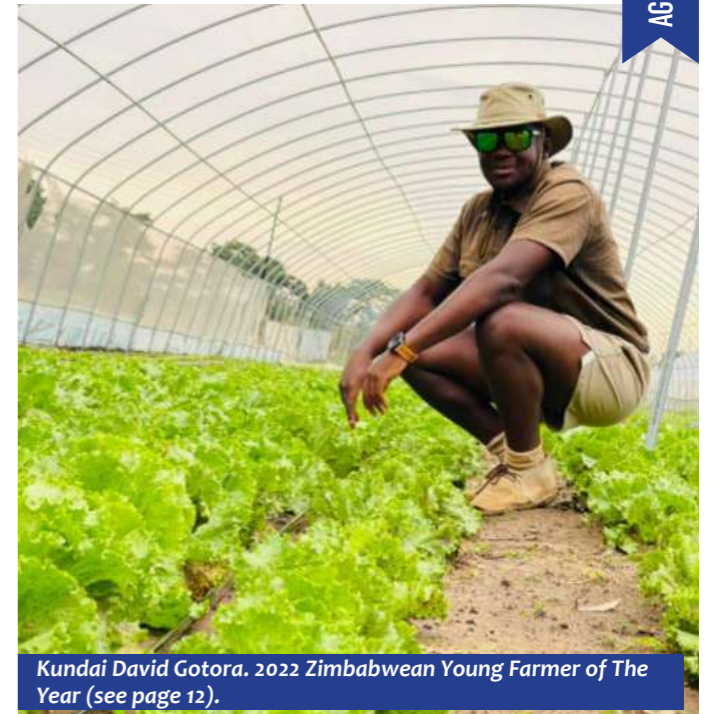
how your employees interact with their work (equipment, livestock, crops), with you, clients, service providers, visitors to the farm and amongst themselves. If the culture is unhealthy, all these interactions can be toxic to the detriment of your bottom line, *7% reduction in profits for every year if you do nothing about it.*

Having diagnosed the ailment what's next? Understand that this will be a team effort and the whole process will take time as it involves not just structural changes but behavioural and mindset shifts.

1. Identifying what needs to change, an honest view of where you are as an organisation. It won't be easy as some of the blame will land at your feet as the leader- fish starting to rot at the head and all that. Take the hints graciously, do not be defensive.

2. Painting a picture of what a future healthy farm culture looks like; I have found writing these down and placing them in a prominent place where everyone has access helps. To get the best out of everyone you need to align the desired culture with the personality and temperament of your team, and getting things done will be so much easier. Just like soil type, climate, topography etc are the contextual variables that we need to take into consideration when implementing our cropping calendar, our people and systems are contextual variables therefore there are no generic formulas.

3. Identifying Culture Champions. These are employees at all levels who will promote the culture changes and can help identify areas of resistance. You are the Chief Culture Champion because you are directly responsible for the culture at your farm.



Kundai David Gotora. 2022 Zimbabwean Young Farmer of The Year (see page 12).

4. Periodic reviews. If you have a small team; involve them, as you expand you may limit the sessions to your culture champions, and it filters to the team. These team meetings will help you keep your finger on the pulse.

5. Find a coach. This is a process, you need someone to walk with you, co- creating customised experiences with you and a buffer when the going gets tough as you navigate this journey for best results.

Poor leadership is building a great team and doing everything you can to hold onto control. No leader can build a great culture without trust.

@giffordthomas

Impact on your productivity, profitability, and efficiency? Studies confirm that organisations which are People + Performance Oriented achieve roughly 30% higher revenue growth compared to Performance-driven or People only focused companies for every \$ invested in human and organisational capital .

I trust I have given you much to think about. Till next time!! Yours,

Rutendo Yolanda Chibanda.

A Transformational Leadership Development Facilitator. Transforming Mindsets, Developing Leaders through conversations and interventions in Agripreneurship, Leadership and Household Food Security at Harambe Trust Consultancy. For more information, call +263783187243 or email rutendochibanda04@gmail.com.

Is Feathering Important in Poultry?

By Dr. G. H. Marutsi (BVSc, Cert PM, MBA)

POULTRY



The thought of why chickens are clothed in different types of feathers could have crossed or missed our minds as we go about the poultry business. The feathers form a cover around the chickens' body, thereby protecting them against all the harsh environments they can be faced with during their lifetime especially the cold winter temperatures.

During production, if a layer hen loses a substantial number of feathers, then production (egg laying) will suffer. For feather regeneration the excess nutrition used for production will be diverted toward feather growth and development. For the chicken to lay an egg the following equation must be always balanced.

$$\begin{matrix} \text{Adequate} & + & \text{Maintenance} & = & \text{Good} \\ \text{nutrition} & & \text{needs} & & \text{production} \\ & & & & \text{performance.} \end{matrix}$$

$$\begin{matrix} \text{Adequate} & + & \text{Maintenance} & + & \text{Stressor(s)} & = & \text{Poor} \\ \text{nutrition} & & \text{needs} & & & & \text{production} \\ & & & & & & \text{performance.} \end{matrix}$$

On insulation - A bird's feathers play an important role in regulating their body temperature, much as hair does for mammals. It is therefore important to note that, poorly feathered birds in cold weather lose a lot of heat and will also have excess nutrition channelled towards heat generation instead of production.

On protection - Feathers help shield birds' bodies from bruises and scrapes, a poorly feathered bird will be susceptible to skin damage. The skin of a chicken is poorly vascularised hence it heals slowly, making the bird susceptible to secondary bacterial infections. 'Bleeders' on the skin are a great temptation to fellow flock mates triggering bad behaviours like cannibalism and subsequent mortalities secondary to the cannibalism or to bacterial infections. These scenarios result in fewer eggs going to the market.

While feathers are often considered a by-product of poultry production (and often a waste by-product), all farmers whether broilers, breeders or layer producers, should consider feather development and quality as a top metric for a successful enterprise.

For more information on poultry production contact, Dr G. H. Marutsi (BVSc, Cert PM, MBA) on 0777 586 262 or email garikai@profeeds.co.zw

Causes of Feather Loss

Causes of feather loss include, but are not limited to high stocking densities, imbalanced nutrition, high/low temperatures, parasites, and dirty environments/disease. Feather loss is usually noted at the base of the tail, around the head and neck, and sometimes on the back. Flocks that experience excessive feather pulling usually

issues during rearing suffer a repeat during production. Farmers therefore ought to take care to minimise stressors leading to feather pulling in their flock to ensure good flock performance. Where feather loss is a problem in poultry farming one should be experienced to differentiate this from the natural process of moulting (natural annual process where your chicken replaces its entire compliment of feathers over a few weeks. In a moult you will see new feathers beginning to appear).

Effects of Feather Loss;

On production - To lose feathers can be a very 'easy process', but feather regeneration is nutritionally taxing. In the case of nutritional deficiencies, the birds end up with varying forms of abnormal feather cover.



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Flock Performance in Layers

By Elizabeth Lisa Makura

Are you in the egg business just to break even? If not, then for your current flock, how is the egg quality (egg weight, size, shell)? What is the laying percentage? What is the Feed Conversion Ratio (FCR)? How is the variation? What are the mortality and morbidity rates? With your existing management systems and strategies, how easy is it to answer the above questions?



Free range layers at Foundations for Farming, Domboshava

The above-asked questions are key as monitoring and evaluation tools for your flock. A farmer can check the performance on farm by comparing these against the standardised values that are gazetted by breeders. The comparison is then used as a basis for adjustments to farm management practices. One may wonder what these tools are and significance of each?

Feed Conversion Ratio (FCR) (input divided by output)

FCR refers to the amount of feed ingested by the bird in relation to the number of eggs laid over a certain period of time. It is calculated as:

$$FCR = \frac{\text{Total feed consumed / day}}{\text{Number of eggs / day}}$$

Ideally an FCR of 0.1562 or less is considered to be good. A slight variation of the FCR formula allows the farmer to get more information from this ratio for example, FCR per dozen eggs, FCR for egg weight amongst others. Using this information, the farmer can make informed decisions to improve on the undesirable aspects and optimise for profitability.

FCR can also be calculated for birds in rearing (before onset of laying). At this stage FCR is also optimised for higher conversion that is most of the feed consumed goes toward

weight gain. Theoretically, an FCR of 1 would be ideal, meaning for every 1kg of body mass (or output) gained, 1 kg of feed would have been consumed. Onset of laying should be at a body weight of 1.35kg-1.40kg ideally at 18 weeks. Feed consumption at that age should be between 115g-125g per day.

Factors that might affect feed intake include but are not limited to heat stress, disease, poor feed quality, issues to do with water (availability and quality). The best predictor of future laying performance is the pullet's body weight as well as body type at the point of lay. Therefore, there is need to ensure that there is optimum development of the bird's physiological development

An underweight flock will reach maturity late which means more money spent on feeding, whereas overweight will get there early but with poor bone development which will affect laying in production. Feed quality, water availability and quality play a critical role in FCR. A well-balanced diet means



A well kept and clean environment encourages good flock performance - Bushman Rock, Ruwa.

better conversion ratio of the feed mass to the desired output (eggs). Non dietary measures such as heavy culling can be implemented to improve FCR by removing the smaller chicks from the flock (late maturing) or non-laying birds to reduce feed costs.

Flock Variation

When the laying birds reach sexual maturity, it is the bird's individual weight at that particular time which determines the start of production. Having a non-uniform flock would therefore mean that there will be production challenges. One challenge is trying to cater for nutritional needs for birds at different maturity levels laying and still developing a compromise has to be made and this will impact on production. A uniform or less variable flock will always out perform a non-uniform more variable flock ceteris paribus.

Uniformity refers to the percentage of the flock that falls within a range of the average flock body weight. Uniformity simply tells us how even the weight of the birds is and it is calculated as follows:

$$\text{Uniformity} = \frac{\text{Number of birds within weight range}}{\text{Total Number of birds weighed}}$$

Where: weight range is $\pm 10\%$ of average weight. The uniformity targets are given in the table below:

Age	Uniformity As A Percentage
1-3 weeks	85%
4-6 weeks	80%
7-16 weeks	85%
17 weeks and above	90%

Flock variation can also be evaluated as coefficient of variation (CV) and a lower CV means the flock is less variable or more uniform. A CV below 8% is good. CV is calculated as follows:

$$CV = \frac{\text{standard deviation} * 100\%}{\text{Average bird weight}}$$

However, variation is evaluated as important to ensure that a representative sample is used, that is at least 2% of the flock. Where birds are overweight or there is low uniformity, delay

diet change and light stimulation until the desired weight is achieved or uniformity improves. Variations are more visible to those that exhibit poorer growths and weight reductions. Rectify this early or the uniformity will remain poor and worse with age.

Egg Production, Egg Weight and Egg Quality

Fact: A layer bird can only lay 1 egg per day. Yes! it takes about 26 hours for just one egg to fully form this means a bird can lay 4-6 eggs on a weekly basis. This is because egg development takes about 5 hours (release of the yolk, formation of egg white and addition of the shell membrane to shape the egg). The remaining 20 hours are for formation of the shell and addition of eggshell colour.

It goes without saying that vaccinations, feed and water quality intake and are key to achieving productivity as such laboratory tests on these elements can go a long way in ensuring good performance. Is it the feed quality that regularly needs to be tested and corrected accordingly? Bear in mind that any lag especially nutritionally related in the bird's life will definitely cause severe negative impacts on the outputs. Production costs that are feed related should definitely not outshine net profits.

Laying hens require a completely balanced diet to sustain maximum egg production. Inadequate levels of energy, protein or calcium will cause egg production levels to drop drastically and reproductive problems. Any other existing factor that might limit feed consumption will go on to reduce egg size. Another sign to weigh out the quality of your eggs would be during the grading process as any deviation from the normal brown egg (from brown feathered layers) or the white egg (from the white feathered layers) should cause alarm.

Now, what happens if production is affected; by either poor feed quality or disease outbreaks on farm? Definitely production will be affected. As a management practice there is need to make sure that there is sufficient clean cool water available. As a rule of thumb, birds will drink twice as much water as their feed intake.

Mortality and Morbidity

(Daily Mortality rate calculation - Total deaths divided by total number present that day multiplied by 100) Without any doubt, mortalities are a direct loss in business, equally bad as a morbid flock. However, since 0% total batch mortality is practically impossible, efforts have to be made to keep it as low as possible. This important parameter should be used in keeping track of health of the flock. In many cases, the greatest culprit is presence of infectious diseases. Therefore, it is important to make sure that mortality rate is kept at below 0.5% after the commencement of laying. During the first 17 weeks of rearing, it should not be more than 2%. So, there is need to follow-through the vaccination programme religiously so as to reduce effects of for example: E-coli, coccidiosis and salmonella.

All the points mentioned above must be taken with maximal attention, the ability to obtain the best economic results and express the genetic potential of the layer breed hinges on these monitoring and evaluation tools.



A scientifically designed 20 layer system that produces 5 000 eggs per year (see ZiMunda Issue 8).



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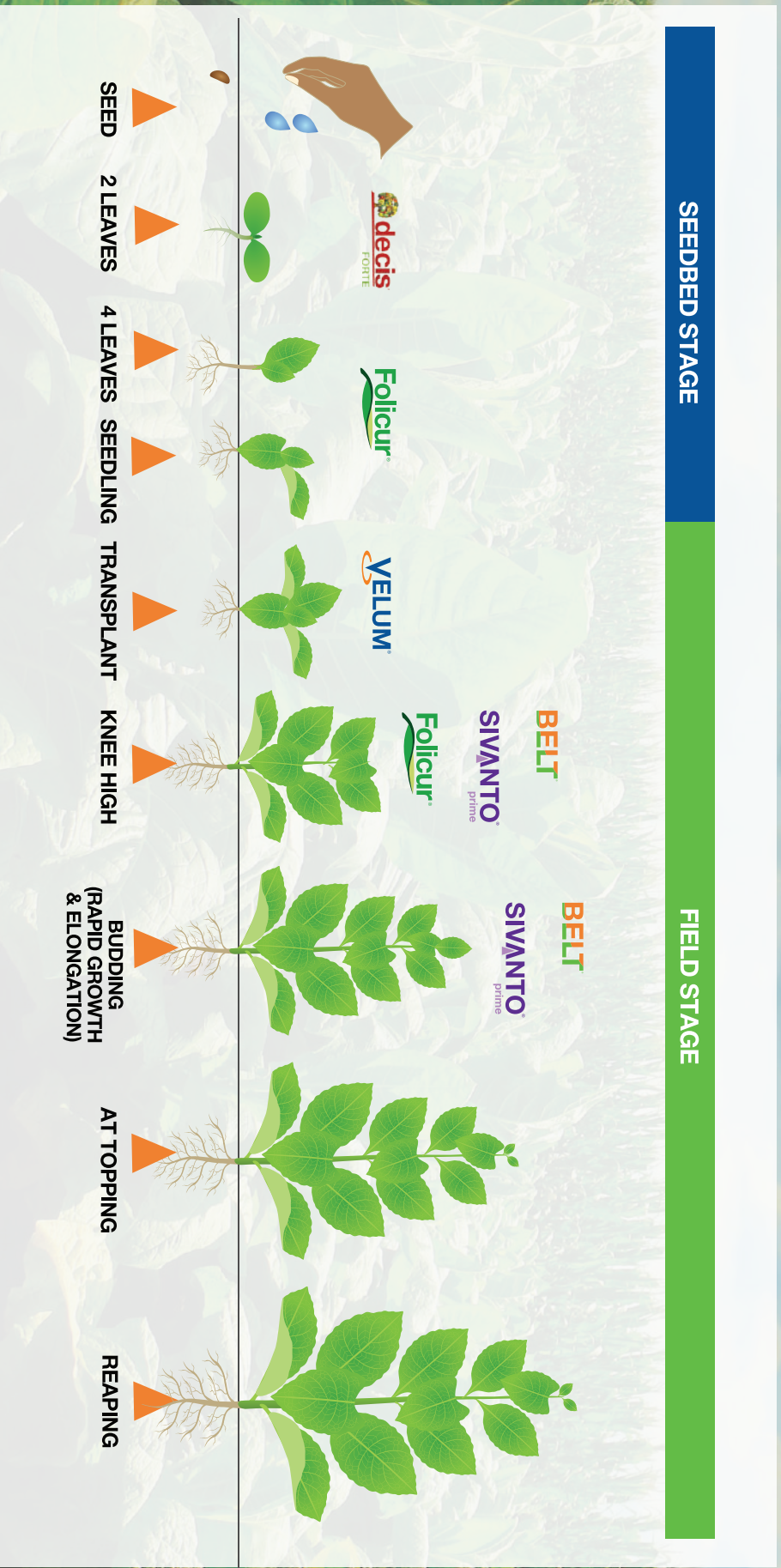


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