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NEWSLETTER

AGRONOMY

Managing Tobacco Seedling

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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.

COVER



Layer chickens at Bushman Rock Safaris, Ruwa

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Grow Better Tobacco Seedlings to Boost Your Crop

By Tegan Buchanan and Helen Simon

SITE LOCATION

Growing tobacco seedlings occurs during particularly unfavourable conditions, consequently meaning that extra attention ought to be applied during periods of their production. This is because a successful tobacco crop depends primarily on a sufficient supply of well-grown and diseasefree seedlings that are made available early in the planting season. However, the success of seedlings is highly dependent on environmental conditions, as well as farming practices, including plant populations and fertilisation. If planting is held up due to a poor supply of seedlings, the resulting crop will not be cultivated in the most advantageous part of the season, where it is wellknown that late-sown crops nearly always give low returns.

SEEDBED PREPARATION

The basics of soil nutrition are applicable when planting the seedlings. Good soil preparation to ensure water infiltration that allows for adequate oxygen and water movement consequently reducing anaerobic conditions is of integral importance. In reducing these anaerobic conditions, one is also reducing the opportunity for bacterial and fungal infection as these are more prominent in these conditions. Thus, the basic take out of soil preparation and maintenance is to aim for aerobic conditions in the soil as roots follow oxygen in the presence of water. This will allow for the development of a large root system, capable of supporting a high yielding crop, all beginning in the soil.



A well prepared seedling bed

From the first of June seedbeds are sown. The most appropriate soils for growing tobacco are the sandy-loam and sandy-clay loam soils which are lightly textured with decent drainage. Once a suitable site for the seedbeds has been determined, there are a few key factors that one ought to consider, such as seedbed positioning, management of the cold, and protection from winds. Thus, in determining the site for seedbeds, one must focus on the seedbed's level of exposure to sunlight, wind, and water. A good supply of quality water is an integral part of seedbed



Cold management through plastic tunnels

production, of which will be discussed in later paragraphs. Seedbeds should face approximately north-east to gain from the best amount of sunlight exposure possible. Protecting the seedbeds from southerly and westerly winds is also highly beneficial in keeping the soil warm which can be compounded by the addition of fine leafy grass cut and placed on the seedlings to keep the soil moisture in creating favourable conditions for germination and growth.

IRRIGATION PROTOCOLS

In continuation, perhaps the most frequent cause of failure in the seedbeds is in not keeping the soil surface adequately moist during the germination phase. As it takes approximately seven to ten days for seeds to germinate in June, the soil surface must be kept moist during the whole of that period. This is where irrigation becomes an integral and often overlooked part of seedbed management. As a rule of thumb, it is generally recommended to apply 2.5l of good quality water per square meter daily, which amounts to 90l of water per bed per day. However, in coming to this number, one must account for soil type and soil water holding capacity.

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Important Considerations

Soil water holding capacity can differ significantly, for example, seedbeds are grown traditionally on sandy loam type soils where these soils tend to have a water holding capacity of 75mm/m. However, heavier soils have a higher water holding capacity, for example fine loamy sand at 90mm/m. Knowing the water holding capacity of your soil allows you to estimate the amount of water that your soil can hold, which may be more or less than the recommended supply of water. This is imperative to determine to avoid over-irrigation which creates anaerobic soil conditions. In conjunction with this, when irrigating one must be conscious of water quality. The quality of irrigation water is most dependent on three factors: pH, dissolved salts, and surface tension. To ensure the maximum effect of irrigation one must ensure pH is desirable, that there is no salt antagonism and that there is no surface tension in the water.

Healthy tobacco seedlings germinating under mulch



THE ART OF TRANSPLANTING

Furthermore, transplanting the seedlings to achieve a decent crop stand is an essential task which in due course will determine the extent of the crop's growth, development, and yield. However, transplanting seedlings into the fields is often a stressful event for the young plants. Area dependent, in minimizing the effect of transplanting shock, seedlings should be hardened off by reducing the amount of water applied approximately two to four weeks prior to planting out in the field. The reason the seedlings are allowed to wilt slightly in the beds is because it is a tool to increase the strength of the seedlings as well as the resistance to abiotic stress such as drought which aids in decreasing the extent of seedling death out in the field. Understanding why we put the tobacco seedling through this stress is important. It is done so to improve not only the resistance of tobacco seedlings to abiotic stress which they will undoubtedly face in the field, but also to increase root expansion. In doing so it promotes the generation of fine white hair root mass which are integral in the uptake of nutrients in the field.

Nutrients such as calcium and phosphate can only be taken up by fine white root hairs. In ensuring that they are grown and nurtured in the seedbeds, one can ensure a higher likelihood of survival when transplanting as well as ensuring that the crop can take up the nutrients supplied in the form of fertiliser.

Tobacco Transplanting



THE AFTERMATH – ENRICHING SEEDBEDS' SOIL HEALTH

Once transplanting ends between November and December, one must consider the maintenance of tobacco seedbeds for years to come. Once the seedlings are taken out, one can plant sunhemp, a legume used to improve organic matter as well as provide nitrogen in low fertility sandy soils that has the added benefit of not harbouring nematodes. Sunhemp has been used widely as a soil improvement or green manure crop because of its ability to generate large amounts of biomass. Because of this, it has the potential to build organic matter levels and sequester carbon. Also, as a cover crop legume it can fix large quantities of nitrogen, enhance the soil's inherent properties, reduce erosion with the added benefit of conserving soil water, and ultimately recycling plant nutrients. In combination with this, one can apply Trichoderma to the seedbeds to help combat against fusarium. Trichoderma spp. are fungi that are present in nearly all soils and other diverse habitats and are opportunistic avirulent plant symbionts meaning those fungi have mutualistic endophytic relationships with several plant species. In soil, they are frequently the most prevalent culturable fungi and are favoured by the presence of high levels of plant roots, which they colonise readily. Several strains of Trichoderma have been developed as biocontrol agents against fungal diseases. The various mechanisms include antibiosis, parasitism, inducing host-plant resistance and competition. Most biocontrol agents are from the species Harzianum.

From the 31st of December, seedbeds must be completed. The reason for this is to control aphids, particularly to control Tobacco Mosaic Virus (TMV) which currently has no cure.

For more information on tobacco seedlings please refer to ZiMunda Farming Newsletter Issue 3, A Brief Guide on the Grounding Work for Seedlings by Eloise Maloney Ripple Mead Farm, Rusape.

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Winter Cover Cropping – A Game Changer!

- By Sandi Roberts, BioAg —

ncreasing soil biology holds the key to improving soil health and farm productivity. If you are having challenges with soil capping, compaction, nematodes, and a whole bunch of other problems that plague farmers today, then it is time to take a serious look at how to improve your soil health. How do you know if your soil is healthy or not? The answer is easy - look for earthworms! There should be 1.5 – 3million earthworms per acre. If you do not see any, it means some of the biology is missing.

INCLUDING COVER CROPS IN CROP ROTATIONS

Incorporating cover crops into your rotation is one of the main ways to improve soil health. It brings greater diversity and there are many benefits, both above and below ground. A recent global study by the University of Illinois showed that cover cropping can boost your soil microbial abundance by 27%. This is over and above the reputation that cover crops already have for building nitrogen, suppressing weeds, preventing erosion, cycling nutrients, improving water infiltration and mitigating against many of the soil nematode and disease problems.

The ideal time to plant winter cover crops is immediately after the summer crop has been harvested. If you have not yet done this, it is never too late to plant! There will still be a noticeable difference, even if it is only in the ground for a couple of months.

For cover crops to be successful, you need to be able to irrigate through the dry winter period and if you have livestock, they would benefit tremendously as this would provide perfect winter grazing. Adding livestock to the mix gives the soil microbes a super charged boost and is also a great way to terminate the crop. A big takeaway from this same study noted that the use of burndown herbicides to terminate a cover crop, negatively impacted soil microbes compared to mechanical termination.

WHAT SHOULD BE PLANTED IN WINTER **COVER CROPS?**

There is a wide range of cool season varieties to choose from and the mix that is recommended generally reflects a farmer's specific requirements and ultimate goals. Some questions to ask yourself; what are the main challenges that you are hoping to address; what level of mechanisation and equipment do you have; will livestock be brought into graze these fields; do you have soil compaction issues or need better water infiltration and of course the big question is what is your budget? Whatever, you decide, it would always be best to include a diverse mix. The picture above is showing a 5-way mix used by one grower where 3 main plant groups have been used, including cereals (oats x2), mixed with brassicas (fodder radish, black rape) and legumes (forage peas and common vetch).

Although summer cover crops like forage sorghum and sunhemp may initially grow well going into winter, particularly in the warmer areas like Chinhoyi through to Kariba, they do not perform well when temperatures drop very low in July. Their growth slows right down and if you

> plan to graze these crops during this frosty time, you run the risk of prussic acid poisoning in your livestock. Ideally fields should not be grazed for at least 2 weeks after frost has occurred.

> Any farmer trying to improve soil health should aim to have living roots growing in the soil for as long as possible. In some cases, winter cover crops are not possible and if this is the case then farmers need to maintain a good mulch cover over the soil.

And finally, in the words of Ray Archuletta, former NRCS soil scientist, "For growers aiming for sustainable and profitable crop production, optimising soil health and function is the ultimate endgame."

AGRONOMY



Regenerative Principle in Cattle and Fodder Crops

— By Rob Jarvis —

At the Agricultural Research Trust (ART) we have embraced the concept of transitioning all of our farming practices into the regenerative agriculture system without delay. Through minimal tillage and reduced tractor passes we want to keep costs down, maintain a mulch as much as possible, reduce dependence upon inorganic fertilisers and chemicals for pest and disease control; try and have living roots for as long as possible and build resilience into the farming system. This improves soil health and increases biodiversity in the soil micro-flora and fauna and consequently revitalises the quality of yield in the crops and fodder crops that we grow.



Emerging zerotilled multi-species fodder crops.

Conventionally tilled wheat – looking good.

To start us off, we have set up a long-term comparative field-scale trial to compare the traditional farming system which involves periodic discing and preparing a seed bed before going into the next crop, whether winter or summer. Against this are two options involving winter fodder crops; one high-end with a multi-species mix of cereals, grasses, legumes and brassicas and, the second a more affordable use of mainly cereal options. The last treatment is to leave the land fallow from previous summer's maize and try planting next summer's soya beans with a zero-till approach. The whole trial is replicated. Superimposed upon the trial will be various treatments that show potential, for instance; Rootsure, a product from Damara is under test as is Effective Micro-organisms from Geoff Bradshaw.

One problem we faced at ART is that although our Monosem planter is capable of planting crops in the traditional systems we employ, it certainly could not cope with the multi-species mix we wanted to test in a thick-mulch situation. So Radzim kindly offered their zero-till seed drill and by grouping the largerseeded fodder crops and the smaller-seeded ones, we were able to direct drill into the same planting lines an amazing combination of up to 9 species of fodder crops.



Blue Lindsay explains how a zero-till seed drill work

The zero-till seed drill was used to also plant the traditional wheat treatment and this of course, after preparing the seed bed with a disc harrow, came up beautifully. With the advice of Radzim's Blue Lindsay, we have been able to get the multi-mix fodder crops to germinate by keeping the field moist and allow the larger seeded crops time to absorb moisture and germinate. The thick mulch meant they were slower to emerge but the crops are there.

Consequentially in due course the wheat will be harvested, the fodder crops will be grazed down by the cattle and the fallow after maize kept weed-free until next summer planting season. In the meantime, our technical consultant/project coordinator Sandi Roberts will ensure that data is collected on water infiltration, compaction levels and on the soil health by assessing visible micro-flora and fauna and also by acquiring laboratory assessments of the bacteria and fungi found over time.

Regenerative principles are very strong on the importance of livestock in the overall scheme of

agricultural practices. At ART farm cattle were us ed to graze down the maize stover from last summer and they will be used at every opportunity going forward. In time we hope to also bring in other forms of livestock to keep on increasing the biodiversity aspect of the whole project.

We are extremely grateful to Willie Ranby who sourced and donated the fodder seed-mixes for the project and our own staff led by Langton Mutemeri Research Manager and Charles Ndoro who will make sure that the long-term project runs to plan.

We look forward to the long-term benefits of regenerative farming, where we will see an increase in soil fungal activity, reduced fertiliser applications and reliance upon herbicides and pesticides and, yet to see no loss in yield, soil growth and becoming more sustainably healthy. Time will indeed tell!

7



Wheat - Peregrine

- 1. Variety Peregrine
- 2. Maturity-very early 113days.
- 3. Very good standability, about 90cm height.
- 4. Very good disease package
- 5. High yielding 7-9t/ha.
- 6. Protein content -11.2%7. Adaptibility both high and low potential areas

Onion - Capricio

MATURITY TYPE Early short day MATURITY IN DAYS 190 - 200 PLANT CHARACTERISTICS Bulb:

For both fresh and dry market TYPE Open pollinated Shape Deep flat round Firmness Moderate Exterior colour Medium straw

Interior colour Cream white DISEASE TOLERANCE Pyrenochaeta terrestris







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Mafuro Farming– Building a Profitable Pasture-Based Dairy

- By Vimbai Ruvengo –

An increased incidence of drought conditions has been affecting multiple dairy-production farmers in Zimbabwe, with farmers having to deal with poor pasture growth, high stock feed prices, and poor/low rainfall conditions (reduced water allocation). This has seen the cost of production grow significantly across the country and has contributed to the decline in milk production. Due to this challenge, some farmers have opted to milk fewer cows, de-stock, or even exit the industry.

Under these conditions of low milk production in Zimbabwe, Sean Webster a young and enthusiastic dairy farmer, has managed to rise above the challenges by adopting the Pasture-Based Dairy System at Mafuro Farming in Marondera. Conventionally farmers used Total Mixed Ration (TMR) method of feeding dairy cattle; essentially the cows are fed with a nutritionally formulated feed mix under confined housing. The feed is formulated to a specific nutrient content, each cow's ration consisting of good quality forages, a balance of grains and proteins, vitamins, and minerals.

While some farmers have stuck to the intensive TMR systems, the practice of Pasture-Based systems has proved to be more cost effective and the success of Mafuro Farming is a good example to all dairy farmers and those intending to venture in the business. Across Africa there is a large movement of farmers developing Pasture-Based systems as this is more viable with the natural resources and conditions available.

THE NEW WAY - PASTURE-BASED SYSTEMS

Having founded Mafuro Farming in 2017 and started practising dairy farming in 2018, Sean and his team are proud to have established a well-designed, productive, and a lowcost Pasture-Based System. Contributing to 4% of national raw milk production and by the end of 2021 increasing to 10% all within 3 years.

Driven by his passion and experience from New Zealand, Sean has capitalised on the strong inverse relationship

between cost of production per litre and proportion of grazed grass in the dairy cow's diet. Mafuro Farming has

'Pasture-based farming lets the animals do the work. They harvest and feed themselves and fertilise their pastures, overseen by the farmer in a carefullymanaged system.'

been to date (June 2021) realising a yield of 23 liters per day per cow. Due to the low amount of concentrate fed per lactating cow (5kgs), this shows for every 217 grams of concentrate fed,1 liter is produced.



Farm Focus



Sean advocates for the adoption of the system by either new or young Zimbabwean dairy farmers as the Pasture-Based model, is a lot less capital intensive, animals are in their natural environment and are operating freely. By putting animals in their happiest environment will give you better results. The system improves animal health, reduces cow turnover rates, improves aspects of

milk quality due to the clean healthy environment, and most importantly practices clean green farming, consciously.

'The secret to profitable milk production in any dairy system is to feed lots of high-quality, lowcost forage.'

MULTI-SPECIES GRAZING MIXTURE

Designing pasture systems for quality, persistence, and seasonal deficits is essential for low-cost dairy farming. This system can be established by:

1. Seeding pastures to a grass or grass-legumecereal mix - selected to deliver high-quality pasture all year round.

2. Seeding most paddocks in the system to a forage mix - selected to persist for years to avoid high costs of reseeding and feeding during reseeding.

3. Seeding some paddocks with annuals to graze during seasonal growth and quality deficits to avoid feeding high-cost stored forage and supplements.

The salad mix at Mafuro farming – A blended mixture of pastures, legumes, and cereals are grown at Mafuro farms; perennial ryegrass (winter feeding), white clover, and chicory (summer feeding), respectively. Sean states that if well managed the perennials can last for 4/5 years. A well-managed legume proportion in a sown grassland (ideally 10% legume content) can result in higher milk productivity and reduced production costs. These savings are achieved through lower reliance in inorganic nitrogen (N) fertiliser, a prominent variable cost in intensive dairy systems.

Sean is also capturing the slurry waste into small dams and putting this through his Centre pivot irrigation to help with the soil regeneration and act as a contributor of fertiliser (see the next article on slurry management).

MANAGED INTENSIVE ROTATIONAL GRAZING

A key focus of pasture management centres on maximising grass utilisation through optimal grassland management, while allowing individual cows to express their individual potential. At Mafuro Farming the cows strip graze from paddock to paddock based on the condition of the grass. Sean states that this is to avoid overgrazing, while giving livestock access to pasture at the peak of nutrition. This practice is termed Managed Intensive Rotational Grazing (MIRG) in Pasture-Based Systems. It strikes a balance between confinement and old-style grazing methods, as the cows freely graze in a confined paddock with temporary electric fences.

According to Sean when establishing the model, he suggests the following;

i. Understand how much arable land you have to put towards pasture for your lactating cows, what soils you have and how much water is available. Those will dictate your first steps to establishing capacity and your greatest contributor to your Cost of Sales; pasture. Every farm is different and not the same as others and should be approached considering all the elements and resources
ii. The money you invest into farming should be prioritized towards areas that contribute towards driving volume and quality. Do not waste money on assets that you want, think about what you need.

iii. Know your numbers. It is important to measure as



much as you can in your business so you can constantly evaluate as you farm monthly or weekly. This gives you the ability to see what you are doing in detail and where you can improve in all aspects of farming. By understanding important areas of your business such as Break Even in liters, or putting a Unit Cost model are small steps to understanding some important numbers to manage your farm.

LIVESTOCK

Farm Focus

The practice of MIRG at Mafuro is profitable with a stocking rate of 3.6cows per ha of grazing area per cow. The cows graze in strips such that the herds move through an area, eating everything available (minimum left; 1,300 kgs of Dry Matter per/ha) and then moving on so that the grass can rest, fertilised, irrigated and grow again. Knowing the volumes, KGs of dry matter grown per day, multiplied by your available grazing, less your total cows grazing required; Gives you an understanding of rotation, as this changes during the year through the seasons.



THE BREEDS - MATCHING THE COW TO THE SYSTEM

The dairy cow is a feed-to-food transformer, converting grass to milk. Consequently, it must possess critical attributes, which are associated with the particularities of the grass-based systems of production. Failure to fully meet the nutritional requirements of high genetic merit dairy cattle for milk yield using a grass only diet will result in low milk yield. Mafuro farms are producing milk with the current quality; 4% butterfat and 3.2% protein. Sean insists on choosing the right genetics for the farm, at Mafuro Farming the herd consists of crosses of Holstein Friesian and the Jersey. Sean noted that Holstein has an advantage of unexcelled milk production and the Jersey has high butterfat content in their milk, heat tolerance, and superior grazing ability.

IMPROVED ANIMAL HEALTH AND WELFARE IN PASTURE-BASED SYSTEMS

Animal welfare is defined not only as maintaining animals' health, but also enabling animals to display natural behaviour, such as mobility, lying down, standing up motions and resting without restriction. Housing cows indoors in confined facilities has been shown to restrict natural behaviour and contribute to the prevalence of diseases including mastitis, lower reproductive welfare, and lameness.

Sean attests to the model as it is eco-friendly; cows grazing in a natural environment. Mafuro Farming accentuates this aspect of the model by supplying mobile technology such as the mobile parlour (first largescale swing over commercial mobile milking parlour in Zimbabwe). As Sean grows and learns on a day-to-day basis, he wants to slowly move his business towards an organic diary, which will complement the already freerange operation. There is a stigma on dairy by those who keep cows in sheds in confined spaces but Sean is leading the charge with his free-range Pasture-Based system.

THE ECONOMICS

A well-managed Pasture-Based dairy farm has to rely on minimal external inputs (supplementary expensive raw feeds, concentrated feed etc.). Each component of a pasture-based system (cows, forages, facilities and human resources) has to coordinate with the others to create a profitable system of production.

The significant potential Pasture-Based grass feeding systems has for the future of milk and dairy production in Zimbabwe is remarkable. The success at Mafuro Farming provides an opportunity to transform and improve milk supply in Zimbabwe. With a Pasture-Based system its proven that you can profit 0,09c per litre in today's economic environment.

Contacts us

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SEAN WEBSTER'S MESSAGE TO THE NEW DAIRY FARMER

"As beginner farmers, we have an opportunity to change the narrative for the Zimbabwean Dairy Industry. The expertise, skills, and knowledge that we have built up at Mafuro Farming are there to be shared with everyone. In collaboration with the Grasslands Research Station, we will be offering a one-year course on Pasture-Based Dairy Systems. One will learn and gain knowledge on pastures, their management, hygiene, and milking. As the Zimbabwean youth we are striving to create a new farming culture and mentality of economically productive dairy farming. A huge market opportunity exists for milk supply, and all it needs is you."

LIVESTOCK

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Lorna Joubert 0772567144 www.facebook.com/luipaardsvlei



CC SALES

Slurry Management in Dairy Production

By James Kabinda, Animal Production Specialist

In dairy production a lot of slurry is produced. Slurry management should be part of the dairy plan, as it can accumulate to high levels if not properly managed.

In dairy, manure is removed as slurry (solid waste plus water) to at least 100m away or into a sump about 30m away from dairy. There are 3 ways of handling slurry and the choice of which system to implement will depend on herd size.

1. UN-UTILISED SLURRY

There are two ways of handling slurry with this system by either using an open cement – line drain or using French-drain or soak-away.

Using an open cement - line drain

This system is efficient for small herds. The drain should be extended 100m away from the dairy unit. The drain should be 0.4 wide by 0.1 m deep to facilitate brushing down and is cleaned daily. The disadvantages of this system are that the potential of slurry as fertiliser is not realised and the area of land around the outflow becomes very wet, vlei-like, and is not utilisable. 10m3 or (10 000L) of slurry contains 25kg Nitrogen, 10kg Phosphorus, and 45kg Potash.

Using French – Drain or Soak-Away

The French drain or soak-away is used to handle relatively small amounts of slurry. It uses a solidtrap, if all effluent flows to soak-away, it should be emptied daily to prevent blocking. May effectively be used for disposal of washing-up water. The disadvantage of this system is that it handles relatively smaller sizes of effluent and can easily be blocked if heavy solid wastes are involved.

2. SUMPS

Sumps with use of a holding or separating tank

This system is used with a cement-lined drain taking all slurry to the sump at least 30 m away. The sump is often emptied every 2 days and contents spread in pasture or crop. On construction the sump should be completely covered for hygiene and to avoid accidents.

Sumps with use of settling tanks

The settling tanks must be 100 m away from dairy, using cement-lined drain to carry slurry to settling tanks. Sequential filtering is used (one tank after another). Settling tanks should be 1.2 m deep, and may use excavated soil to build-up sides of tanks. The quantity of slurry to be processed determines the size of tanks. Barriers of railway slippers, concrete blocks, or suitable material can be used, placed 23 mm apart to allow fluids to drain to the next tank. Liquid from secondary tanks can be piped into fish ponds, or sumps connected to irrigation. The disadvantage of this system is that it requires specialised equipment for removing solids from tanks and spreading in field, and it requires light and free draining soils.

3. SUMPS TO IRRIGATION SYSTEMS

With this system, all water and manure are pumped out of sump into irrigation of pasture or crop utilising a specialised irrigation system (with very large (14mm) self-clearing nozzles). Irrigation system can only pump slurry at 5% dry matter. This system reduces fertiliser requirement of the farm and conversely reduces cost. Additionally, it reduces the irrigation water requirement.

Factors to consider when selecting best system for you

- Quantity of slurry produced.
- The frequency of clearing the slurry.
- The type of soil of farm.

• The compatibility of the system with the cropping system.

If the slurry is not properly taken care of in dairy production, it can result in a fly and insect problem; which in turn increases stress in cows. Stress has a negative effect on growth rate and milk production.

James Kabinda is an Animal Production Specialist and can be contacted on 0774225873, or jameskabinda@gmail.com.

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Aquaculture Distributors - Supporting Success for Zimbabwe's Fish Farmers

by Tawanda Hakutangwi, Projects Manager

With a global growing demand for fish as an alternative and a more secure source of protein in meals and other uses, there is need to boost Zimbabwe's position as a significant supplier of fish by contracting more farmers to join this lucrative industry.

Tilapia niloticus which is also referred to as the bream because of its high growth performance, yields, and economic benefits compared to other tilapia species has become a major candidate for commercial aquaculture in Africa and Zimbabwe is no exception.

When growing Tilapia, one should religiously follow the feeding program, control water quality and correctly stock the fish densities, in order to harvest the fish within a space of 6 months and each fish weighing 400 to 500grams each.



Fish sample weighing 450g at 5months. From one happy farmer in Domboshava

FISH FARMING REQUIREMENTS

1.Training

Aquaculture training is normally done when the fish seed is delivered to the farmer, who is also equipped with enough knowledge on feeding quantities and quality, water management, daily pond maintenance, and disease control.



A consultant from Aquaculture Distributors imparting knowledge to aspiring farmers.

2.Land Recommendations

All types of soil are suitable for pond construction. The space required depends on the pond sizes chosen by the farmer. Farmers are encouraged to choose within the following set of pond dimensions (although ponds can be customized according to the farmer's specifications):

- 10m x 10m x 1.5m pond
- 20m x 10m x 1.5m pond
- 20m x 20m x 1.5m pond
- 20m x 30m x 1.5m pond



Local Focus

3.Water

Clean water which is free from contamination is one of the essentials in fish farming. Borehole water, river, and dam water can be used in fish farming. The use of council water is permitted but degassing of chlorine should be put into consideration.



4.Fish Seed

Genetically improved seed should be stocked for the farmer to have a good harvest. At Aquaculture Distributors we stock sex-reversed fingerlings and deliver seed between the period of August to mid-April every year. The fingerlings are starved and packed in oxygen bags for transportation. Oxygen bags help to transport the seed for up to 72 hrs.



ABOUT AQUACULTURE DISTRIBUTORS

Aquaculture Distributors was established in 2015 to engage in contract fish farming

> throughout the country. This encompasses fish growing and fish breeding of "Tilapia Niloticus".

Aquaculture Distributors has experts ready to deliver fish seed and train farmers for 3 hours on site. The company offers free online training for any customers in need of training prior to the project. To join Zimbabwe's fastest-growing family of aqua farmers, Aquaculture Distributors requires that a prospective contractor pays for pond construction and fish feed. The company will then supply free fish seed to grow, technical guidance and also purchases back everything from the farmers, reducing the risk of financial loss.



Fish feed ready for transportation

5. Fish Feed

Tilapia can survive and grow without supplementary feed. Because of this good reason tilapia grow in fertilised ponds feeding on phyto and zoo plankton. These ponds can be fertilised using chicken manure or pig manure.

If one is into commercial fish farming the purchase of supplementary pellets is recommended and these are given in monthly stages as follows:

- 1st month Starter crumbles
- 2nd month Juvenile 1
- 3rd month Juvenile 2
- 4th,5th, and 6th month Grower pellets

For more information on fish farming please call +263 782698408/+263 778905221 or email us at info@aquaculturedistributors.co.zw

For more articles on fish farming. Refer to ZiMunda Farming Newsletter Issue 6 (the Black solder fly production), Issue 9 (the Irrigation Ditch or Pond System, Aquaculture at Serepta Farm), and Issue 14 (Deep-Green Fish Pond Waters).

Images provided by Tawanda Hakutangwi.

LIVESTOCK

What Causes a Sudden Decline in Egg Production?

By General Beven Mundida, Livestock Consultant

Question: I have 100 chickens and I used to pick 80 eggs and above per day, but suddenly, I am now only picking 40-50 eggs daily. I am wondering what the problem could be since all the chickens look healthy?

Answer: Unravelling the cause of a sudden drop in egg production requires a thorough assessment of the birds by the poultry farmer, as there are checkpoints that often identify the specific cause for low egg production in a poultry farm. Some of the factors that cause low egg production in laying hens include;

1. BROODINESS

A broody hen in the chicken house can affect the flock's egg production. Not only does it stop laying eggs; the mere sight of it sitting on a nest can inspire a chain reaction of other hens to brood resulting in fewer eggs overall. In order to curb this problem, brooding hens should be set up at a different location away from laying boxes.



2. WATER DEPRIVATION

Laying hens consume more water on days when an egg is laid, than on non-laying days. Scientific studies show that the daily water intake is more than double on these days. The requirement for this excess of water implies a considerable metabolic stress associated with egg formation. Adequate, generous, clean quantities should therefore be given to the chickens and placed in areas where they can access it easily. Ensure that the water is not very cold or hot such that its temperature discourages drinking.



3. OCCURRENCE OF DISEASES OR PARASITES

Laying rates will automatically be affected if the hens are sick or have parasites such as worms, coccidia, lice, or mites. A decline in egg production can be an indicator of parasite infestation among the birds. If a new flock had been introduced into the chicken house followed closely by a decrease in egg production, chances are that the new flock came in with some communicable diseases which should be investigated. If some chickens die, it is important to seek out a veterinary specialist to carry out a post mortem of the carcass to identify the cause of death and help arrest its devastating impact on the rest of the flock early enough from a point of information.

POULTRY

4. LAYING EGGS HAPHAZARDLY OR HIDING OF EGGS

This problem is mostly common in free-range chickens. Some hens will get into the habit of laying eggs in different places i.e., bushes or any hidden places, while others have the bad habit of not laying in one place. The egg count in the farm will therefore keep reducing due to these habits. This bad habit can be curbed by making laying nests warm and comfortable and generally training the birds to lay in one particular place.



5. A SUDDEN CHANGE OR INSTANCES OF STRESS

The actions of the farmer or any other external factors, some well-intentioned, can have devastating consequences leading to stress and thus reduction in egg laying. Hens have been found to be very responsive to stress and can be affected for very long periods of time by certain disturbances; a change in the structure of the chicken house, a sudden change in feeds provided, addition or death of large numbers of flock, parasites such as worms, excessive heat, vicious fight with a predator, dogs barking, or irritation from the actions of handlers among others.

6. MOULTING - THE SHEDDING OF FEATHERS

The natural way through which chickens shed their old feathers for new ones is called moulting. It leads to diversion of proteins from the production of eggs to the development of new feathers. This can lead to decline in egg production. It is important therefore to give protein supplements during moulting to ensure both processes go on without interruption.

7. DECREASED LIGHTING CONDITIONS

A decrease in lighting can cause a reduction in egg production. Hens need at least fourteen to sixteen hours of light each day in order to lay eggs effectively. Light plays a role in motivating or triggering the pituitary glands to begin the process of production of eggs.

8. REPRODUCTIVE DEFECTS OR PROBLEMS

Incidences of diseases or problems in the oviduct can cause egg production to stall. Any swelling in the abdomen or related complications should therefore be reported to a vet specialist immediately.

9. OLD AGE

A decline in egg production can also be as a result of age. Naturally, flocks that have grown old will produce fewer eggs due to changes in body functions due to the passage of time. This happens from the age of two years onwards.

10. ATTACK BY PREDATORS

Eggs can also decline due to attack by predators e.g., snakes or rats. The chicken house should be properly secured against all predators.

11. EGG EATING

Chickens can develop a habit of eating eggs. Always ensure there are no broken eggs left in the chicken house because once the hens discover how rich the protein in the eggs is, breaking the habit can be a very difficult task.

For more information on Optimising Egg Production - Layer Hen Management, refer to ZiMunda Farming Newsletter issue 10.

Any questions or inquiries on poultry please call/ WhatsApp +263 776 420 161 or email gbmundida@gmail.com



Pictures were provided by the farmer and ZiMunda Farming taken at Bushman Rock Safaris, Ruwa.



POULTRY



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Croco Commercial – Your Partner for Agricultural Equipment

6

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Croco Commercial, a subsidiary of Croco Motors specialises in the sales and servicing of tractors and complimentary implements from reputable brands such as New Holland, Fieldking, and Sfoggia planters as well as other heavy-duty vehicles such as buses and trucks. Accessible nationwide with representatives in Harare, Bulawayo, Masvingo, Selous, Chiredzi, Kadoma, and Mutare. Croco Commercial, is a trusted and reliable partner in the Zimbabwean market.

Due to farm mechanisation being such a critical driver for efficient production in the Zimbabwean agricultural sector, Croco Commercial is deliberate

about always offering up to date, relevant, and affordable solutions, like the New Holland TT4 series that is characterised by excellent design and maneuverability, ergonomic comfort and fuel efficiency. Engineered to offer farmers ultimate versatility, featuring 2.5 tons maximum lift capacity, up to 54LPM hydraulic flow and 10 new transmission options the TT4 series is tailored for every farming operation. Additionally, Croco Commercial also has a wide range of implements such as reversible and fixed disc harrow ploughs, cultivators, planters, and backhoe loaders.

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POINTS TO CONSIDER WHEN CHOOSING A TRACTOR

Selecting the right tractor and attachments can be daunting, but it does not have to be a chore. The following pointers will guide you to talk with a nearby Croco Commercial tractor dealer.

1. Take consideration of the size of your farm - Large-scale farms require tractors of more horsepower (45-70 HP) as there are a variety of farm tasks to perform such as tilling, spraying, mowing, etc. whereas, for smaller size farms, tractors of about 35 HP may fit for agricultural purpose.

2. Your Budget - You need to have a defined budget to guide you to get what you are looking for in a tractor.

3. Horsepower - The choice of horsepower is dependent on the size of your farm and the variety of tasks to be do. **4. The Engine** - The engine determines the horsepower of the tractor and the kind of work that it can handle.

5. The right hitches and lift capacity - There are different types of hitch attachments that are designed to raise or lower any attached equipment with ease.

6. Comfort and Safety - sufficient space between pedals and fenders, the design of the operator's platform, seat adjustability and steering wheel.

Choose Croco Commercial a reliable tractor dealer to buy your tractor. Let your present and future needs guide you into making a decision, take time to understand what makes a great tractor, and never put more emphasis on one factor only.

THE EDITOR

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Helpline 311

Are You Ready for In-Crop Spraying?

By Geoff Bradshaw, Willow-Green Products

The key to a good outcome from any spraying operation is being well prepared, knowing how to do the job, and executing the spray the way you planned it. It is important to start your preparations well in advance of when you need to spray the crops.

PRE-SPRAYING CHECKS

Here are some of the factors one has to would consider. Boom sprayer pic

- What type of sprayer is to be used knapsack or boom sprayer?
- Is the sprayer in good working order? No leaking hoses or fittings.
- Are the tank, filters, and nozzles all cleaned out after the last application?

• Check for nozzle wear by comparing the nozzle flow with that of a new nozzle at the same pressure. If the flow rate is 10% more than a new nozzle, then nozzles need changing.



Boom Sprayer at the Agriculture Research Trust, Harare

Once you have selected the chemical you are going to apply, ask yourself these questions;

- Have I READ and UNDERSTOOD the label of the chemical selected?
- Is it the appropriate product for the crop, the pest to be controlled, or the timing of the application?
- Is there need to add other chemicals or additives?

CHEMICAL MIXING PROCEDURE

Once you have selected the chemical dosage and total volume for application (water and chemical) based on the recommendations on the label; one then needs to calibrate the sprayer to apply the selected application rate per hectare.

Application rate (lit/ha) x Speed (km/hr) x Spray width (metres)

600

Example: <u>200 lit/ha x 4.0 km/hr x 0.9 metres</u> = 1.2 litres/min 600

'As a rule of thumb, use fan nozzles for herbicides and hollow cone nozzles for fungicides and insecticides.' In this example one could use a blue nozzle at 3 bar pressure or a red nozzle at 1.8 bar pressure.

• If applying a herbicide, it would be best to use a red fan nozzle at 1.8 bar with minimal drift.

• For a fungicide it would be better to use a blue hollow cone nozzle at 3 bars, which would give better coverage of the target.



Calibration Equipment

PRE-SPRAYING CHECKS

The primary goal with calibration is to determine the actual rate of application in litres per Ha, then to make adjustments if the difference between the actual rate and the intended rate is greater or less than 5% of the intended rate. You will require a tape measure to check distance (speed) and for measuring the spray width, calibration jugs, and a timing device to time the speed and nozzle flow. Practically check the sprayer using water.

CHECKING THE APPLICATION RATES

- Speed of the operator or tractor over a fixed distance (a speed suitable for the conditions and the land/area to be sprayed).

- Spray width–adjust the nozzle or boom height to achieve the correct spray width/ overlap.

- The nozzle flow rate - If the flow rate is not as desired, then the pressure will have

= Nozzle flow (lit/min)

to be adjusted (small adjustment) or the nozzles need to be changed (large adjustment).

-Use lower pressures to minimise drift with herbicides. With each type of nozzle there is a range of sizes allowing you to achieve the flow rate you need.

Expert Advice

THINGS TO NOTE WHEN SPRAYING

Ensure you have the appropriate protective clothing for the product being applied.
Are the weather conditions suitable for spraying?
Avoid windy conditions which can cause spray drift.
Avoid spraying in hot dry conditions when chemical will evaporate, and the plants are also not receptive to the

chemical. -The success or failure of your pest control spray application will be determined by the quality of the

product being applied, the timing of the operation in relation to the pest, the weather conditions, the skill and training of the operator, and the sprayer and its adjustments.

Spray Quality and Nozzle Outputs

These flow rate figures are typical of all nozzles used for agricultural applications. Spray quality will depend on nozzle type and design as well as pressure. Note: Check with your nozzle supplier for the actual spray quality for their nozzles.

Nozzl	e Code	FF110/0.4/3.0	FF110/0.6/3.0	FF110/0.8/3.0	FF110/1.2/3.0	FF110/1.6/3.0	FF110/2.0/3.0	FF110/2.4/3.0	FF110/3.2/3.1
ISO C	Colour	Orange	Green	Yellow	Blue	Red	Brown	Grey	White
	1.5	0.29	0.42	0.56	0.85	1.13	1.41	1.70	2.26
ure - Bar	2.0	0.33	0.49	0.65	0.98	1.31	1.63	1.96	2.61
	2.5	0.37	0.55	0.73	1.10	1.46	1.82	2.19	2.92
	3.0	0.40	0.60	0.80	1.20	1.60	2.00	2.40	3.20
ess	3.5	0.43	0.65	0.86	1.30	1.73	2.16	2.59	3.45
4	4.0	0.46	0.69	0.92	1.39	1.85	2.31	2.77	3.69
				Noz	zle output	in litres/m	inute		
Spray Quality		Fine	e F	ine/Mediun	n Me	dium	Medium/Co	barse	Coarse
S	pray \	Volume,	Speed	, Nozzi	e Outpu	ut & Ca	libratio	n Equa	tion
Nozzl	e Outpu	t (litres/min	ute) =Spr	ay Volume	(I/ha) x For	rward Spee	ed (km/h) x	Nozzle Sp	bacing (m)
						600			

Now you are ready to spray your crop!

Geoff Bradshaw is a Trainer and consultant in Good Agricultural Practice and Pesticide Application. A supplier of appropriate spraying equipment. He can be emailed on bradshaw.geoff@gmail.com **Images provided by Geoff Bradshaw and ZiMunda Farming Magazine**







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Understanding **Agrochemical Labels**

By Doug McClymont

All agricultural products have a colour-coded hazard warning on the label. These warnings are very important and relate to how poisonous the products are to humans and to the environment.









LABEL	LD/5	0 Range	Recommended clothing	Classification	
COLOUR	Oral Toxicity	Dermal Toxicity			
Purple	0 - 100	<400	Rubber gloves/boots waterproof jacket and trousers hat/face mask or respirator	Very Dangerous Poison	
Red	101 - 500	400 - 2000	Rubber gloves/boots mask/ strong cloth jacket or overalls (ULV - use respirator)	Dangerous Poison	
Amber	501 - 2000	2000 - 4000	Rubber gloves/long sleeved overalls	Poison	
Green	>2000	>4000	Rubber gloves/long sleeved overalls	Caution	

Generally Amber and Green label chemicals need not have major protective clothing but it is as well to have it for the others (See Table). This is especially important with organophosphates, as these are cumulative poisons in that the body does not excrete them quickly. Thus, use of a relatively safe chemical over an extended period of time can lead to chronic poisoning. Better safe than sorry - FULL protective clothing at all

LD/50 RANGE EXPLAINED

LD/50 is the amount in mg/kg body weight of a laboratory rat that will lead to 50% deaths. This is the universal method of expressing how poisonous a chemical is and usually is a good guide to human toxicity. The warning relates to the "formulation" rather than to the active ingredient. One product may contain 25% of active ingredient as an Emulsifiable concentrate and be classed amber label, but as a 1% dust it would only be considered slightly hazardous and therefore a green label. It is a general rule that amber and green label products can be bought on supermarket shelves, but anything more hazardous than that must be locked away and only sold to responsible or licensed retailers.

RECOMMENDED CLOTHING

Coupled with the hazard warnings are instructions on the safe use of these pesticide. These relate to what protective clothing should be used. There are little pictograms on the side showing what should and should not be done. It has been my experience that these are less than useless in illiterate cultures where the users suffer from 'cognitive conservationism', i.e., the inability to see two-dimensional drawings in three dimensions. They either have to be trained what the symbols mean or else they will not obey or understand them, especially if there are new symbols on the labels of new formulations.

times with special emphasis on the Purple label chemicals only being used with respirators with new cartridges.



The manufacturers name is always included on the label with contact details. Many labels give a 24-hour emergency toll-free hot line if there are problems.

AGRONOMY

CHEMICAL CONTAINER DISPOSAL

The hazard warnings also include instructions on the disposal and/or care of the pesticide containers. Generally, pesticide containers **SHOULD NOT BE USED FOR ANYTHING ELSE AND SHOULD BE PUNCTURED AND BURNT OR BURIED WHEN EMPTY AFTER USE.**

GENERAL WARNINGS

After the hazard warnings, on every label there are general warnings and precautions included at length. These relate to five main areas;

1. The environment – these warnings carry specifics, where required, on leaching, drift and other contamination problems and the dangers to wild life and so on.

2. Carry over – these warnings relate to problems with persistence, particularly of herbicides in the following crops or problems with grazing the plant residues.

3. Residues on harvested material – these warnings usually contain harvest Intervals which are the periods between application and consumption of the fruit, grain etc.

4. Application specifics – these warnings relate to the effective period or stage that the chemical can be applied, either to get maximum effect or to reduce residues in the plant. Issues such as wind and wind speed and temperature are normally included here. There may also be warnings on water quality especially with products such as glyphosate.

5. General warnings and precautions – these are any other warnings that may be relevant. Today more and more are we seeing these warnings including the 'reentry period', which designates the soonest time the sprayed area may be entered after application. This is especially important in horticulture in general and green or shade houses in particular. With herbicides there are usually list of weeds controlled and suppressed by the product – this makes it important for you to make sure you know your own weed spectrum so you are applying the product that will kill them.



Be especially careful of the difference between 'control' and 'suppression'. 'Control' means that the weed will be killed or rendered non-competitive to the crop. 'Suppressed' means that only under specific conditions will anything like satisfactory control be experienced. Under these parameters it is always as well to include a further herbicide to the mix if complete control is required of a definite weed problem. If the weed problem is very minor then 'suppression' may be adequate but never perfect.

RATES OF APPLICATION FOR VARIOUS CROPS AND CONDITIONS.

Every reputable manufacturer has tested rates of application and is prepared to back them up providing they are used in conjunction with the warnings, precautions and within the specifications laid down. In Zimbabwe chemical products are not registered until the Registration Officer is satisfied that sufficient testing has been satisfactorily carried out.

For various crops the application rates given relate either to the rate per ha or to the concentration, especially if large volumes are being used. In many cases rate per ha is not a feasible figure as the state of growth of the crop may vary from farm to farm and land to land. For instance, in citrus where one has small trees to giants over 4 m tall, the rates are often given as a concentration per 100 l spray mix. In this manner if the farmer applies the chemical to the trees to get an even cover, the rate he applies will relate to the stage of growth in that land and the actual amount of spray mix will vary widely according to the height of growth. The same applies to post-emergent herbicides. Large weeds will take more than small weeds in the same land and the conditions within the land will vary so a rate per hectare is an average that is too imprecise.

RECORD KEEPING

Having read all your labels, it is worth taking a copy of each and keeping them in a file. You can then make notes either on the label copy or stapled to the label copy so when you use the product again you will have the data right there. This is very important where product is illegally imported from countries that do not have Zimbabwe registrations or conditions. For instance, an imported label may not have paprika on it and yet you require the product for say powdery mildew on paprika. If you have the notes in your label file then there is no problem – if you have not then it is pointless going to the label to get the rate and any precautions. Remember that the manufacturers and distributors only put the major uses on the label usually to save space, so a label file will soon become a goldmine of information.

In many cases chemical warnings take up volumes but they are all relevant and should be adhered to no matter how tiresome they appear when one is trying to get the product on the field!