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Stockfarm spoke to Prof Robin Meeske, specialist scientist at the Western Cape Department of Agriculture's Outeniqua Research Farm near George, and Grant Pringle, head of agronomy at Pannar, to find out what, in their opinion, constitutes a suitable crop for silage production as well as their take on silage mixtures. Prof Meeske believes it is possible to ensile any crop successfully, if it is cut at the most optimal stage. Meeting the basic principles of ensiling is also essential. "It begins with the correct dry matter (DM) percentage of 30 to 35%. This is followed by material that is finely chopped, well compacted, and a bunker that is tightly sealed to prevent oxygen infiltration. To lower the pH as quickly as possible, oxygen must be removed, and sufficient sugars and efficient lactic acid bacteria must be present." Read more about the Plaas Media Santam Agriculture National Silage competition here. Maize yields are generally good and provide high-quality forage. Prof Meeske says maize, in those regions where it can be cultivated successfully, is the best crop to ensile as it yields around 18 to 30t/ha DM, which can be produced under irrigation in four months. Maize is also easy to ensile as it has enough water-soluble carbohydrates (sugars), compacts easily and does not have a high buffer capacity. "The pH drops to 4 or lower within three to five days after ensiling. A sorghum hybrid (sorghum x sorghum) can be considered in summer rainfall regions where the soil is too marginal for maize cultivation." There is a range of crops that are suitable for ensiling, says Pringle. Of these, maize is the best option as a summer crop, especially in high-potential regions where it grows well. Furthermore, the grain content in maize silage increases its energy value. Other suitable summer crop options are grain and forage sorghum; temperate grains such as oats, barley and rye can be cultivated for silage purposes during the autumn and winter months. Grain and forage sorghums, compared to maize, have excellent drought tolerance and are therefore suitable for cultivation in regions in which drought conditions are common. Forage sorghum is also a more viable option if maize theft is a problem. Forage sorghum (sorghum-Sudangrass) has a high yield, says Prof Meeske, but its energy value is much lower than that of maize silage. Legumes such as lucerne contain a lot of protein and few sugars, making them difficult to ensile: small grains such as oats, triticale and barley must be ensiled at the soft-dough stage (DM 30 to 35%). Because small grains contain few sugars, the recommendation is to apply a homofermentative lactic acid bacterial inoculant during ensiling. "More often than not silage production fails because of a too high moisture content (>70%). Wet silage also contains butyric acid and is unpalatable. Oxygen and water are the two biggest enemies of silage. Material should be thoroughly chopped and compacted to make sure no oxygen infiltrates the silage. Yeasts and fungi will grow and multiply as long as oxygen is present." According to Prof Meeske, superior maize silage consists of 35% DM, a pH of 3,8, between 7 and 9% protein, 72% total digestible nutrients (TDN), 30% starch, between 40 and 44% neutral detergent fibre (NDF), 5% lactic acid, and 1,5% acetic acid. Small-grain silage should ideally have a DM of 30 to 35%, pH of 3,8 to 4, protein of 9%, TDN of 62%, an NDF of 55%, lactic acid of 6%, and 1,5% acetic acid. Pringle believes the nutritional value of silage is highly dependent on the quality of the crop and timing of harvesting. "Crops that are harvested too soon will be difficult to compact in the bunker. Not only that, but the high moisture content may cause the nutrients to seep out of the bunker." The immature grain crop also contains less starch which reduces its quality. "If you want to make top-quality silage, the crops must be harvested at the correct growth stage. Maize silage that was cut at the optimal time will have a DM of around 35%, starch of 30 to 35%, a protein content of 6,5 to 7,5%, and an NDF as a percentage of DM (%DM) of approximately 40 to 45. Sorghum silage will have an average DM content of 27%, a starch content of >17%, protein of 5 to 6%, and an NDF %DM of 55." Because of the low protein content of maize and small grains, they are often ensiled together (e.g. maize and soya beans). Small grains can be ensiled together with cow peas, vetches, lupins or faba beans. "However," says Prof Meeske, "mixtures are complex, and it is often better to ensile the crops separately and then mix them at feed-out." In his experience, says Pringle, mixing crops for silage production is not a straightforward process. This relates to the cutting time of the silage crop - crops must be cut at the most optimal stage in their growth cycle to guarantee high quality. Synchronising the growth cycle of two crops to gain the highest quality is no simple task. "I have seen maize and soya beans mixed in a 50:50 ratio on a hectare basis in the silage bunker." In this case, the soya component will elevate the protein content of the silage, while the maize, which makes up much of the DM in the bunker, ensures good compaction and sufficient sugars for rapid ensiling. - Christal-Lize Muller, Stockfarm For more information, send an email to Prof Robin Meeske at Robin.Meeske@westerncape.gov.za or Grant Pringle at grant.pringle@pannar.co.za.