PRODUCTION OF SILAGE FROM MAIZE

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Abstract – The study was carried out on the production of silage from maize plant done by fermentation. Processing of the silage as energy source to dairy cows was studied. In the present study discussed maize silage production in terms of selecting a high yielding maize variety, harvesting, fermentation. Fermentation in a silo; non protein nitrogen additives; ensiling in towers, effluent production, removal of silage and feeding; changes in the composition during ensiling; energy protein and mineral contain and the use of maize silagein production system for dairy cows.

Key words – Corn silage, forage yield and quality, growth, dairy cows, nutritive values.

INTRODUCTION

Silage is a type of fodder made from green foliage crops which have been preserved by acidification, achieved through fermentation. It can be fed to cattle, sheep and other such ruminants. The fermentation and storage process is called ensilage ensiling or silaging. Fodder converted into succulent feed for livestock through processes of anaerobic bacterial fermentation. Corn silage is high moisture fodder that farmers use to feed their domestic animals, especially during the dry season made of corn silages are made by chopping the crops into small pieces and then storing them. The chopped crops are compressed and packed in polythene bags. Fermentation happens leading to formation of lactic acid and acetic acid. Fermentation continues in 3 weeks. Creating a nutritious and high energy feed for livestock. Corn Silage is a high-quality forage crop that is preserved by anaerobic fermentation.

This process uses bacteria to convert soluble carbohydrates into acetic acid and lactic acid, which pickels. The crop corn silage is important for improved cow nutrition. It is safe to feed because it contains a mix of grain and fiber corn silage can be used to increase live stock growth rates improve overall health of the cattle and maximize milk production.

How to improve the nutrition of former's milking animal when each family keeps only one dairy cow? During the cold continental winter, the major fooders available are wheat or maize together with hay and concentrated feeds. Silage is a high moisture fermented fodder used as a feed for livestock. It is produced by allowing chopped green vegetation to ferment under air-tight conditions. During the ensiling process water soluable carbohydrates are converted to acids, which lowers the pH and protects the silage from further deterioration. To optimize silage production, management practices specifically designed for this purpose should be followed. When growing corn for silage, it is important to consider animal performance in addition to yield. (Alvaro Garcia, 2019)

In the production of silage the main product which was formed is citric acid. Citric acid is a weak organic acid with the formula C6H8O7. It is a natural preservative conservative and is also used to add an acidic or sour taste to foods and drinks. Many microorganisms, such as fungi and bacteria, can produce citric acid but A. niger remained the organism of choice for the production of citric acid due to its genetic stability, high yields, capacity of using cheaper raw material and absence of undesirable reactions. (Shami E. A. Bakhiet et al., 2015)

MATERIAL AND METHODS

Collection of Sample

The sample was collected from the agricultural region of the Akola City. Maize is a common silage crop wherever it can be grown successfully. Silage made from corn is very tasty, and average yields are 10 tones of silage from 20 tones of maize per hectare. Maize needs to be cut at 15 cm from the ground and chopped into pieces of around 1 cm. The kernels are the primary source of starch in maize silage, and they must be cracked before being placed in the silo. Newly made maize silage contains about 10 percent sugar, which can cause acidosis, where too much acid forms in the stomach, so it is best to wait at least two months before using the maize silage as feed (Food and Agriculture Organization of the United Nations., 2020)

Chopping and harvesting

Corn silage was chopped to improve silo preservation and enhance animal performance. From this perspective a one-size-fits-all chopping strategy is not available. More mature, drier corn silages (ie., those harvested at black layer) may have more starch stored in their kernels, however this starch was not as accessible as in those harvested earlier. If too dry it will not pack and ferment well, and thus heating and molding are possible. Drier, mature silages may benefit from post-chopping kernel processors or Shredlage. On the other hand, corn silage with moisture levels higher than 70 percent, may lead to butyric acid fermentation. If the odor of the silage changes because of butyric fermentation, it may result in reduced palatability and total feed intake, as well as feed sorting at the feed bunk (Alvaro Garcia, 2019)
Preparation

Plants were harvested by a six knife forage harvester. The lucerne was second cutting, 20-40%, bloom stage, wheat was in the early bloom stage and the maize in the early dent stage. The fresh forage was inoculated with Sg/kg Silagain additive to give viable populations of 10^9/g each of L. acidophilus and Candida spp. Fifty-five kg of the freshly harvested forage was packed in polyethylene bags (2-4x 10-3 mm thickness) placed in 0.21 m³ steel drums. Care was taken to exclude air during packing and sealing of the bags. Suitable uninoculated controls were included. The drums were stored for 32 d at ambient temperature (21 C) and samples were removed for microbiological and chemical analysis (Nancy J. Moon, 1980)

Protective percarp of intact corn kernels must be broken to provide access for rumen microbes and digestive enzymes that digest kernel starch. The addition of a kernel processor to a forage harvester accomplishes this task. In this process, the chopped particles are passed between two rollers set 1-3 mm apart that break the kernels. Shredlage rolls are set a similar distance apart, but the shredlage rolls are cross-grooved and run at a greater speed differentialthan traditional kernel processing rolls. With either technology, well-processed corn silages should have at least 95% of its kernels broken, and the cob should be broken into six or more small pieces (Richard E. Muck, 2020)

Compacting

The aim of this research was to determine silage quality under different compaction conditions of the whole-plant harvested at three different maturity stages. These were the beginning of Anthesis, one-third Milk Line, and Black Line. Five compaction applications (control, vacuum, and compaction with 150, 248 and 498 kPa) were carried out in the study. For this purpose, cylindrical plastic mini-silos (5.2L) were used. The chopped forages were compacted in mini-silos at five pressure levels. Each treatment was ensiled for 50 days in cylindrical plastic mini-silos (5.2L) silos with three replications. This study showed that compaction level and maturity stage had significant effects on silage quality (p< 0.05). The dry-matter content increased in the silages with maturity (Toruk T. et al., 2010)

The additives have been available for enhancing silage preservation for decades. The review has been divided into 6 categories of additives: homofermentative lactic acid bacteria (LAB), obligate heterofermentative LAB, combination inoculants containing obligate heterofermentative LAB plus homofermentative LAB, other inoculants, chemicals, and enzymes. The homofermentative LAB rapidly decrease pH and increase lactic acid relative to other fermentation products, although a meta-analysis indicated no reduction in pH in corn, sorghum, and sugarcane silages relative to untreated silages. These additives resulted in higher milk production according to the meta-analysis by mechanisms that are still unclear. Lactobacillus buchneri is the dominant species used in obligate heterofermentative LAB silage additives. It slowly converts lactic acid to acetic acid and 1,2-propanediol during silo storage, improving aerobic stability while having no effect on animal productivity. Current research is focused on finding other species in the Lb. buchneri group capable of producing more rapid improvements in aerobic stability. Combination inoculants aim to provide the aerobic stability benefits of Lb. buchneri with the silage fermentation efficiency and animal productivity benefits of homo-fermentative LAB. Research indicates that these products are improving aerobic stability, but feeding studies are not yet sufficient to make conclusions about effects on animal performance. Muck, R. E. et al., (2018). The inoculum was taken and inoculated in a potato Dextrose Broth. The inoculum contained three different types of Fusii. The Potato Dextrose Broth which contains the inoculated culture of Aspergillus niger is mixed with the chopped forage. Filled into silo at stored it for the 21 days. Feeding

Silage should be fed as soon as possible, preferably within a few hours. After feeding, the feed bunks must be cleaned out to prevent any remaining silage, which will spoil, contaminating the next feed out. Silage can be provided to animals in number of different recipes based on its composition and the breed and use of the animals. In general silages should be used up to 25 kg per day for 550 kg animal and up to 5 kg for sheep and goats. The following recipes are used most commonly to obtain the best results when feeding a 550 kg animal. Alfalfa hay 7 kg followed by Maize silage 17 kg Alfalfa hay 2 kg, meadow hay 3 kg, maize silage 15 kg, rye grain 1 kg Alfalfa hay 2 kg, meadow hay 3 kg, maize silage 12 kg, oilbeat fresh, 15 kg (United States Agency for International Development).

RESULT AND DISCUSSION

Silage is a type of fodder made from green foliage crops which have been preserved by acidification, achieved through fermentation. It can be fed to cattle, sheep and other such ruminants. The fermentation and storage process is called ensiling ensiling or silaging. Fodder converted into succulent feed for livestock through processes of anaerobic bacterial fermentation. Corn silage is high moisture fodder that farmers. Use to feed their domestic animals, especially during the dry season made of corn silages are made by chopping the crops into small pieces and then storing them. The chopped crops are compressed and packed in polythene bag. Fermentation happens leading to formation of lactic acid and acetic acid. Fermentation continues in 3 weeks. Creating a nutritious and high energy feed for livestock.
Production of Silage from Maize Plant

Corn silage hybrids that have a slightly higher maturity rating than grain hybrids, and cultivate early at rates 2,000 to 3,000 plants/acre higher than for grain production. Row spacing should be appropriate for the agricultural system, and harvesting corn for silage removes more N, P, and K than harvesting corn for grain. If the field is routinely harvested for silage, consider increasing the amount of fertilizer or manure applied to the field. (Alvaro Garcia, 2019) The fodder needs to be chopped to ensure a proper ensiling process. Make sure that the chopper blade is sharp. A chopped length of the forage between 2 and 4 cm is desirable; shorter lengths will not stimulate the rumen activity sufficiently, and longer lengths will make it more challenging to achieve a proper ensiling process. You can cut shorter more mature crops, while younger forage can be cut larger (James Airey, 2020)

In the present study the maize plant is harvested, chopped into 2.5 cm pieces and the leaves and stems were uniformly mixed and prepared for the small scale i.e. silage is prepared 2 000 kg with two people, one animal traction cart and a stationary chopper—the estimated duration of silage making is as follows Manual harvesting 3 hours, Loading 1 hour, Transporting 1 hour, Chopping 1 hour, Filling and compacting 3 hours, Sealing 1 hour. Therefore, the total time needed is around 10 hours; this does not include the time you will need for drying/wilting the forage. Make sure you have this time available before you start filling the silo (Food and agriculture organization of United Nations, 2020).

Once all the material was in the silo, continue compacting until the silage contains no soft patches. Critical areas for the silage are on the sides of the silo pit, so make sure these areas are compacted as much as possible. The silage should be ready at least three weeks after preparation, but as a rule of thumb, 60 to 70 days produces an optimum fermentation. The length of time before feeding, however, depends on the quality of the forage used and the availability of forage to be ensiled. Newly made maize silage contains about 10 percent sugar, and since this could cause acidosis, it is especially important not to feed newly made maize silage too early. (James Airey, 2020)
CONCLUSION

Excellent silage can be made from Grass, Maize (Com), Sorgfhum, Legumes, Alfalfa. In this study the Maize was selected because Maize is a common silage crop whenever it can be grown successfully. Silage made from corn is very tasty and average yields and 10 tonnes of silage from 20 tonnes of maize per hectare. Newly made maize silage contains about 10% sugar, which can cause acidosis, where too much acid forms in the stomach, so it is best to wait at least two months before using the maize silage as feed. Corn silage hybrids that have a slightly higher maturity rating that grain hybrids, and cultivate early at rates 2,000 to 3,000 plants/acre higher than for grain production. Fodder converted into succulent feed for livestock through processes of anaerobic bacterial fermentation. Corn silage is high moisture fodder that farmers. Use to feed their domestic animals, especially during the dry season made of corn silages are made by chopping the crops into small pieces and then storing them. In addition, the effect of the broad range in chemical composition of maize silages on the total tract digestibility of dietary nutrients, milk production and milk composition of dairy cows is quantified and discussed. In the present study after the feeding of silage the capacity of milking of dairy cows was increased.

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