Data Note

Scientific and technical experiment for manufacturing silage in Jordan

ABSTRACT

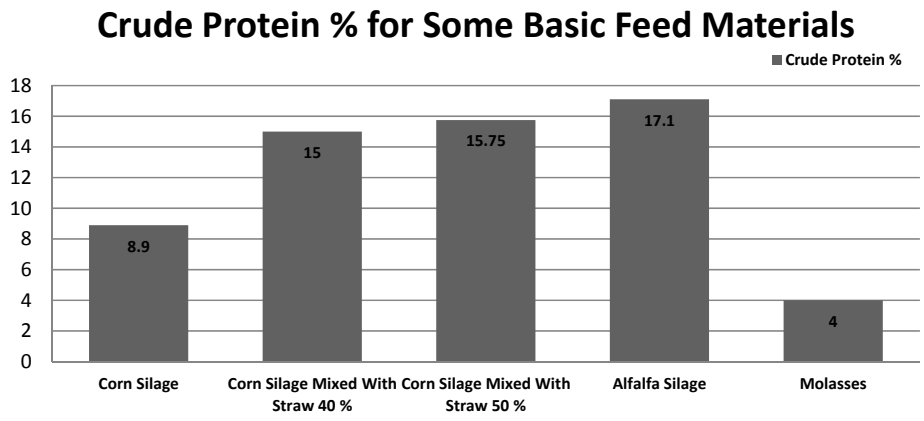
Silage is a feed material that has been widely used in previous periods because it has an effective and useful role in feeding animals, saving in the cost of feed and increasing productivity. From the scientific-practical view it is considered as a feed material preserved in an anaerobic environment that ferments sugars and carbohydrates and thus produces organic acids (lactic, citric, and butyric acids), where organic acids work to keep feed material for long periods. A lot of practical experiments have been done to reach the best high-protein percentage mixture. This extension project was designed and implemented in 2017 by the Jordanian Ministry of Agriculture in collaboration with farmers and scientific research stations of the National Center for Agricultural Research. Ten feed mixtures were prepared with the necessary laboratory tests to determine the quality of the produced silage. Mixings of alfalfa and corn were made with varying percentages of the two components so that the total does not exceed 100%. In addition, 5 mixtures were made of the first five mixtures, with a total of only 200%. After laboratory testing, the highest protein percentage was found to be 15.25% when corn mixed 100% with alfalfa by 100%. It is recommended to make this mixture for livestock breeders, especially cow breeders without adding molasses and industrial additives so that the highest yield is achieved, saving in the cost of feed and increasing productivity. This short scientific observation aims at presenting a technical and scientific experiment for the production of the best silage by the highest protein level through the use of various mixtures of corn and alfalfa.

Keywords: *Corn, Jordan, Silage.*

INTRODUCTION

Silage is a feed material preserved in an anaerobic environment that ferments sugars and carbohydrates and thus produces organic acids (lactic, citric, and butyric acids), where organic acids work to keep feed material for long periods. Silage is produced from corn plants usually planted using fresh water or treated wastewater in an area characterized by high solar radiation intensity and thus ensuring high efficiency in photosynthesis and production of chlorophyll, sugars, and starches. Certain slicing mechanisms are used to cut the plants into small homogeneous pieces so that the fermentation process is highly efficient as well as digestion in animal bodies. Natural silage is obtained from plants that are not sprayed with any chemical pesticides and filled with high pressure, helps to preserve and prevent damage for one year without any industrial additives. Modern technologies have created other sources of silage, such as alfalfa crop, molasses, liquid nutrients (supplements), and hay treated with urea.

Name[1] reported in the advanced silage corn management (a production guide for coastal British Columbia and the Pacific Northwest) on 2004 that the average protein content in corn silage was about (8.9%). Very close findings reported for Sudan-grass hay in 1994 by Harb et al [5] of about (9%). However, a reference published by the extension services at Oregon State University in 1981 proved that the percentage of crude protein in the alfalfa silage was (17.1%) [4]. Similar findings of (17%) reported for alfalfa hay in 1994 by Harb et al. [5]. In addition, the nutritional value of sugar-cane molasses was (4%) of the crude protein [2]. Crude protein percentages for corn silage, alfalfa silage, and sugar-cane molasses are shown in graph (1).



Graph Figure 1. (1) shows The crude protein percentage of corn silage, alfalfa silage, molasses and some mixtures, and compositions.

Material and Method

Marina company implemented Mixtures and bales of corn silage with alfalfa [3]. The results showed that the percentage of crude protein is (15 %) when mixing the corn silage with alfalfa hay (40%), while the mixing of corn silage with alfalfa hay of (50%), the crude protein content increased to (15.75%) **(graph**Fig. **(**1).

An experimental trial was carried out by mixing various mixtures of green raw feeds and exposing them to fermentation for 50 days. Laboratory tests were performed and results were shown in Table 1. The mean protein content of the 10 mixtures was (8.795%). Mixture number 6, which was 100% mixing of corn with alfalfa at the same percentage gave the highest percentage of crude protein percentage, which is (15.25%). The percent of increase for mixture number 6 on the average of all mixtures was about (73.39%).

How the protein content **:[1u]Comment** was defined

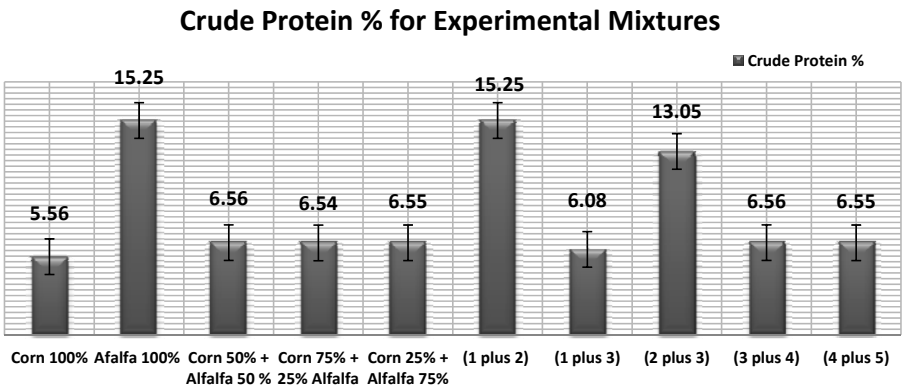
Table (1): Mixtures of fermented silage for 50 days and results of the analysis.

No.	Material	Crude Protein %
1	Corn 100%	5.56
2	Alfalfa 100% [1]	15.25
3	Corn 50% plus Alfalfa 50 %	6.56
4	Corn 75% plus 25% Alfalfa	6.54
5	Corn 25% plus Alfalfa 75%	6.55
6	(1 plus 2) [2]	15.25
7	(1 plus 3)	6.08
8	(2 plus 3)	13.05
9	(3 plus 4)	6.56
10	(4 plus 5)	6.55
No.	**Material**	**Crude Protein %**
11	Average	8.795
12	% of Increase (6:11)	73.39

[1] It is noted that the highest and best results were for alfalfa 100%

[2] The best mix with respect to the crude protein percentage was mixture number 6, which represents mixing corn with alfalfa by 200%.

Vertical bars in the **graph (**Figure 2**2)** indicate the standard error of the mean (n=5). Each record in the graph is the average of five samples drawn from the original fermented sample.



Graph Figure 2**: shows The crude protein percentage of current applied experimental mixtures. Vertical bars indicate the ($^{+/-}$) standard error of the mean (n=5).**

The images and figures from 1 to 4 steps show samples preparing for fermentation. The green corn and the alfalfa were brought and introduced to a device slicing machine which used to cut the plants into small homogeneous pieces. The fodder mixtures were then prepared with a varying ratio in preparation for 50 days of fermentation.

Figure 1: Corn before cutting

Figure 2: Feeding of the machine operated by the tractor

Figure 3: Cutting output

Figure 4: Filling process

CONCLUSIONS

Fermented silage can be made by adding 100 percent of the green corn to 100 percent of the green alfalfa. The crude protein content after fermentation is high (about 15.25 %) without the addition of molasses. This reduces the cost on the farmers while ensuring the required protein content and high economic return.

REFERENCES

[1] Bittman SH, Kowalenko CG. Advanced Silage Corn Management: A Production guide for coastal British Columbia and the Pacific Northwest. Pacific Field Corn Association. 2004.

[2] Cleasby TG. The feeding Value of Molasses. Proceedings of The South African Sugar Technologists'Association. 1963; April: 113-117.

[3] Marina Company. Agriculture Development. Marina's Silage. Corn and Alfalfa Silage Bales.1992. Accessed 20 April 2019.
Available: http://www.marinaagri.com/

[4] Hannaway DB. Alfalfa Silage. Oregon State University. Extension Service. 1981.

[5] Harb M, Zakaria H, Kurdi I. Al-Tahleel Al-Kemawe lel A'alalaf Al-Mahlyahh Al-Ordonyahh. Majalatt Almohandis Al-Zera'ae. 1994; 54 (3). Arabic.