NUTRITIONAL AND ECONOMICAL EVALUATION OF ENSILING MAIZE TEOSINTE HYBRID FORAGE COMPARED WITH MAIZE SILAGE IN EGYPT

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SUMMARY

Six hybrids of maize crop (MS) (*Zea mays L.*) and maize teosinte hybrid forage (MTF) (*Zea Mexcana Schrad*) were planted separately for 2 seasons under practical conditions of farms in north of Delta Egypt to estimate economic and nutritional benefits of maize teosinte hybrid silage (MTS) compared with maize silage (MS) on the mixed farming systems (crop / livestock) at the national level. This study included also 3 proposal scenarios (S) to evaluate effect of generalization MTS package to cover the feed gap as (TDN and DCP) and maize as grain gap or reduce grain maize in Egypt. S1: Replacement of corn fodder (drawa) area (310088 feddan) by MTS.S2:Replacement of MS area(438547 feddan) by MTS.S3:Replacement of drawa and MS area (748634 feddan) by MTS. Highly significant differences were recorded among MTF and all tested MC as fresh or silage on DM basis and fresh yield. The MTF produced the highest total fresh and dry forage along with fresh and dried as silage yields 60.18, 16.02 and 54.16 and 15.10 ton/feddan (fed) ve. 20.87 and 5.81 for MC and18.78 and5.42 ton/fed. for MS, respectively. Chemical composition and feeding values of both silages were not significant different except CF. MTS showed the highest value of TDN (66.30% vs. 64.17%) and the lowest value of DCP (4.48% vs. 4.92%) without significant differences between the two kinds of silages. All tested genotypes of MTS and MS showed high quality silages with suitable fermentation characteristics. Applied S1 at the national level could be reduced TDN and DCP gap by 73.88 and 66.67% and covering about 15.01% of maize grain gap (S1).While S2 and S3 reduced TDN and DCP by 104.9, 94.30% and 178.36, 160.97%, respectively. Meantime high quality feed resources as TDN and DCP would be increased by + 3.29 and + 0.19 million ton, respectively at the national level.

Key word: *Maize (Zea mays L.); Maize teosinte (Zea Mexicana Schrad) hybrid; Nutritive value; Silage quality Feed gape (TDN and DCP) in Egypt.*

INTRODUCTION

The aim to increase livestock productivity and farm income in Egypt has led to introduction and adoption of new technologies, forages conservation as silage is one of feed technologies it can be used to improve quality and availability of forages all year round. Moreover it would be enhance and maintain milk production and avoid the dietary disorder as the result of traditional winter and summer feeding systems .Furthermore. Green forge conservation play important role in significant decrease the feeding cost.

The production of forages in sufficient quantity and quality throughout the year becomes a necessity in all production systems. It aim to higher productivity and improve milk and meat production at considerably low cost. In additions to partially fill the gap in protein and energy shortage. Ensilage has been used as an alternative in fodder preservation with view to greater productivity and animal performance. Therefore, the development of Egyptian agriculture must move to efficient and more demanded production systems to increase competitiveness and ensure sustainability (Walaa Mousa *et al*., 2017).

Maize silage plays an important role as a main feed in the livestock industries for many countries. The main reasons for popularity of maize for silage purpose are the high yield obtained in single harvest it can be ease ensiled and its high energy value as a feed (Topps and Oliver, 1993). Definitely, introducing new forage crops instead of maize crop with high DM and TDN yields and can be ensiled to avoid the rapid increase of making maize silage and decreases import great quantity of maize grains. Walaa Mousa *et al.* (2017) evaluated production characteristics of eight genotypes (six maize SC hybrids) and local teosinte and its hybrid with maize (SC10) along with their silages and found that hybrid of (maize x teosinte) produced the highest total fresh, dry forages yield and the highest TDN value with good quality silage. Therefore, the objectives of this study were: Estimation economic and nutritional benefits of maize teosinte hybrid silage compared with maize silage on the mixed farming systems (crop /livestock) at the national level in Egypt.

MATERIALS AND METHODS

Forage crops used for silage:

Six hybrides of maize crop *(Zea mays L.)* Three way cross 324,352,368 and single cross 10, 30k8 and 2031 and maize teosinte hybrid forge *(Zea Mexcana Schrad)* were planted separately for 2 seasons (2019-2020) under similar agriculture treatments (irrigation, fertilization, etc.) Three farms in the north of Delta in Egypt have the same practical condition were selected for test three proposed scenarios. All suitable and agriculture practices recommended by the National Forage Crops Program were applied .Three plots with an area of 4.2m^2 for each variety and hybrid were taken randomly in the dough stage of maturity to estimate the yield of the whole plant of both experimental crops per feddan(fed).MC and MTF were harvested at the dough stage of maturity and representative samples from fresh forages of each crop were taken for chemical analysis. Whole plants of each crop were chopped (1.5-2.5 cm length) using a chopping machine. Then, each kind of fresh plant was filled layer by layer (about 50 cm height) and the wheel of a farm tractor was used to ensure good pressing and packing of silage. When the silo was filled, it was tightly covered by plastic sheet then covered by approximately 20 cm layer of soil to get anaerobic conditions and ensiled for two months until starting feeding lactating buffaloes. Before starting feeding trials color and odor were analyzed. Silages samples were taken for chemical analysis and quality examination.

Determine of silage quality:

Samples of each kind of silage were taken for testing silage quality: pH value was determined by using Orian 680 digital pH meter, Ammonia– nitrogen, total volatile fatty acids (TVFA's) and Lactic acids concentration were determined according to the methods of Analytical Chemistry of Foods (1995).

Chemical analysis and nutritive values:

Chemical analysis of fresh crops and tested silages samples were taken to determine DM, CP, EE, CF and ash according to the methods of AOAC (2000), while, NFE values were calculated by differences. Determine of nutritive values of tested silage total digestible nutrients (TDN) and digestible cord protein (DCP) according to equations of Wardeh (1981).

TDN for grasses= 87.555-0.8741×CF%
DCP for grasses= -2.6028+ 0.9336×CP%

Economic evaluation:

$$\text{Price of TDN yield per fed.} = \frac{\text{TDN yield per fed.} \times \text{pric of one ton CFM}}{\text{TDN content of CFM(65\%)}}$$ (Gaafar, 2001)

$$\text{Economic efficiency} = \frac{\text{price of TDN yield of maize teosint hypride silage}}{\text{price of TDN yield of maize silage}}$$

Statistical analysis:

Data were statistically analyzed using **IBM SPSS statistics (2014)**. Differences among treatments were tested by the Multiple Range Test of **(Duncan, 1955).**

RESULTS AND DISCUSSIONS

Morphological characteristics of tested crops:

Morphological characteristics that can be measured easily could be used by plant breeders as selection criteria. Results showed that maize teosinte hybrid forage gave the highest value of tailoring capacity per plant (4) vs. one only for all tested genotypes of maize crop. Also, it had the highest number of ears / plant compared with maize crop (8 small ears / plant vs one or two big ears). Meantime, MTF recorded the highest value of plant height (480.0 cm) vs. 250.0 cm for all tested MC. The variation in the performance of tested morphological characteristics may be due to disparity in genetic makeup of these genotypes.

Yield and chemical compositions of tested crops and silages

Results in Table (1) showed that MTC recorded the highest fresh and DM yield (60.18 and 16.02 ton/fed.) respectively, compared to the average yield of all tested MC (20.87 and 5.81 ton/fed). However, the differences were highly significant ($P < 0.01$) between the two tested crops. Obtained results for MC are within the values recorded by Gaafar (2001) who found that DM yield of corn plant at the dough stage of maturity ranged from 4.3 to 7.27 ton/fed using ten different genotypes of maize crop were cultivated under practical condition of farms in different area of Delta (Egypt). Table (2) indicated also, that cultivated one fed. MTC could be increase fresh and DM yield/fed by 288.36% and 276.21% respectively, compared with maize crop. Fresh and dry matter yield variations of both crops may be due to disparity in genetic makeup of the two tested crops.

Table (1): Average fresh and DM yield (ton/fed) of tested crops cultivated under similar treatments (irrigation, fertilization, etc.).

Item	MTF	MC	MSE	Sig
DM%	26.62	27.83	0.76	0.497
Fresh yield (ton/fed)	60.18^{A}	20.87^{B}	6.40	000
Dry matter (ton/fed)	16.02^{A}	5.81^{B}	1.69	000

Different capital letters indicates a significant difference in the same row ($p<0.001$).
MTF: Maize teosinte hybrid forges MC: maize crop

Chemical composition of tested crops (Table2) indicated That the overall means of CP, EE, CF, and NFE were nearly similar without differences being 7.85, 2.20, 26.05 and 54.65% vs. 8.01, 2.61, 26.42 and 54.54% for MTF, espectively.Meantime, the MTF had the lowest value of OM % (90.75%) and highest ash (9.25%) contents with highly significant differences compared with maize crops being 91.59 and 8.41.Obtained results are in agreement with Gaafar (2001) who reported that OM, CP, EE, CF, NFE and ash. content of MC in the dough stage of maturity ranged from 7.52 to 8.87, 2.35 to 3.56, 23.25 to 28.65%, 51.88 to 65.40 and 4.45 to 7.94 % for CP, EE , CF, NFE and ash contents respectively, for eleven maize hybrids and varieties.

Table (2): Chemical composition of MTF and MC

Item	DM%	Composition of DM:					
		OM%	CP%	EE%	CF%	NFE%	Ash%
MTF	26.70	90.75b	7.85	2.20	26.05	54.65	9.25^{a}
MC	27.83	91.59^{a}	8.01	2.61	26.42	54.54	8.41^{b}
MSE	0.76	0.20	1.57	0.15	0.84	1.01	0.20
Sig	0.497	0.032	0.667	0.208	0.845	0.962	0.032

Different lowercase letters in the same column indicates a significant difference ($p<0.05$).
MTF: Maize teosinte hybrid forges; MC: Maize crop.

Chemical composition of MTS and MS (Table3) showed that there were no significant different between both tested silages expect CF. MS silage recorded the highest value of CF (26.64%) with significant different ($P< 0.05$) compared with MTS (24.20%). The overall mean of chemical composition of tested silages are in agreement with those of Walaa Mousa *et al.* (2017) who reported that OM, CP,

EE, CF, NFE and ash contents ranged from 91.65 to 93.55, 5.94 to 8.14, 22.96 to 27.38, 1.75 to2.76, 55.97 to 58.91 and 6.45 to 8.35% contents respectively, for eight maize and maize teosinte hybrid silages.

Table (3): Chemical composition of experimental silages.

Item	DM%	Composition of DM					
		OM %	CP %	EE %	CF %	NFE %	Ash %
MTS	27.87	91.93	7.59	2.24	24.20[b]	57.90	8.07
MS	28.87	92.30	8.06	2.66	26.64[a]	54.94	7.70
MSE	0.85	0.23	0.15	0.15	0.67	0.87	0.23
Sig	0.600	0.475	0.147	0.188	0.086	0.110	0.475

Different lowercase letters in the same column indicates significant difference (p <0.05)
MTS: Maize teosinte hybrid silage. MS: Maize silage.

Nutritive values of experimental silages:

The values of TDN and DCP for MS and MTS were 18.46, 1.41% and 18.48, 1.24%, respectively as fresh and 64.61, 4.54% and 66.28, 4.45, respectively, on DM basis (Table4). There were no significant differences in the average means of TDN and DCP values between all tested silages. Obtained TDN and DCP values of maize silage are within the values recorded by Gaafar (2001) for maze silage. Meantime, nutritive values of tested MTS nearly similar with though obtained by Walaa Mousa *et al.* (2017) being 64.15% and 4.08% DCP.

Table (4): Nutritive values of the tasted silages combined across two (2019- 2020).

Item	DM%	TDN%	DCP%
Seasons M S	28.26	18.52	1.42
MTS	27.87	18.48	1.29
MSE	0.85	0.46	0.07
Nutritive value on DM			
MS	100.	64.17	4.92
MTS	100.	66.30	4.48
MSE	---	0.52	0.14

Quality characteristics of the experimental silages:

Table (5) indicated that high quality silage with suitable fermentation characterized with yellowish green color no brown or black, had a firm texture with no slimness texture and good smell was observed. Also all tested silages were free from mold, must smells and other objectionable odors (ammonia and butyric acids odors. or tobacco odors). The pH values of the different genotype of MS and MTS ranged from 3.73 to 3.87, which were within the normal range of good quality silage.

Table (5): Quality Characteristics of experimental silages.

Items	MTS	MS	MSE	Sig
PH	3.87	3.73	0.06	0.269
Lactic acid % of DM	5.66[a]	5.00[b]	0.18	0.081
TVFA'S % OF DM	1.97	1.89	0.07	0.994
NH3-N % of total –N	4.64	4.59	0.26	0.945

Different lowercase letters indicates significant difference in the same row (P <0.05).

Good quality silage should have a pH value of 4.0 or less Ranjhan (1980). Lactic acid% of tested silages, were 5.66 and 5.00% for MTS and MS, respectively with significant differences (P<0.5).This may be attributed to the higher content of NFE in MTS compared with MS as it is found in Table (3). Total VFA concentration in all kinds of tested silages ranged from 1.89% and 1.97%, with insignificant

differences, which revealed acceptable silage fermentation. Value of NH3-N concentration of different tested silages ranged from 4.59 to 4.64% of total N. These results indicated good quality silage as stated by McDonald *et al*. (1995) who mentioned that NH_3-N % of good quality silage being usually less than 10% of total N.

Output of ensiling maize teosinte hybrid forage compared with maize silage:

Observation concerning fresh, DM, TDN,CP and DCP yields of silage for tested crops (Table 6) indicated that ensiled MTF produced the higher values compared with MC (54.16, 15.10, 10.0l, 1.15, and 0.67 ton/fed. vs. 18.78, 5.42, 3.50, 0.44 and 0.27 ton/fed., respectively.

Table (6): Yield of fresh, DM, TDN, DCP ton per feddan and economic evaluation of MS and MTS combined across two seasons (2019-2020).

Item	MS	MTS	The impact
Fresh crop yield (Ton/fed.)	20.87	60,18.	287.58
1-Fresh silage yield (Ton/fed.)	18.78	54.16	288.39
2-DM%	28.87	27.87	---
DM yield(Ton/fed)*	5.42	15.10	278.6%
TDN yield of silage (Ton/fed)**	3.5	10.01	286.0%
CP yield of silage (Ton/fed)***	0.44	1.15	261.4%
DCP yield of silage (Ton/fed)****	0.27	0.67	248.1%
Economic evaluation			
Price of TDN yield of silage (LE/Feddan)	32307.7	92400	---
Revenue of MTS		60092	---
Economic efficiency	---	2.86	---

Not : 1: The percentage of fresh and DM losses of both silages were 10.0%
**DM yield (Ton/fed) = Fresh yield ×DM% **TDN yield (ton/fed)= DM yield×(TDN %)*
****CP yield (ton/fed) = DM yield×(CP %)**** DCP yield (ton/fed)= DM yield×(DCP %)*
Revenue of MTS /fed =price of TDN of MTS /fed -price of TDN of MS/fed.

The impact of ensiled one fed maize teosinte hybrid was 278.6, 286.0, 261.4 and 248.1% for DM, TDN, CP and DCP, respectively, compared with ensiling maize crop. Economic efficiency for ensiled the two tested crops as the ratio between the price of TDN yield/fed of MTS and the price of TDN yield /fed of MS indicated the output of ensiled MTF per fed was doubled by 2.86 times in comparison with output of MS.

Economical evaluation of MTS used for feeding animals on the national level:

The development of Egyptian agricultural must move to efficient and more demanded production systems to increase competitiveness and ensure sustainability. In that aspect there is a needed for investment and deal a good agricultural crop rotation which require to produce enough diet for human and animals. According to limitation of cultivated area and water availability the expansion is one of the main concern of researchers in Agricultural Research Center (Crop Research Institute).Meanwhile cooperation between researchers within the Agricultural Research Center has a good impact on productive of crops and animals. In that aspect the cultivated area of drawa and MC for making silage were 310087.0 and 438547.0 fed., respectively (Table7).The amount of TDN and DCP produced at the national level were estimated by 261512.00 and 76880.26 ton,, respectively for drawa and by 1534914.5 and 118407.7 ton., respectively for MS. Meantime, obtained results showed that MTF produced 54.16, 15.10, 10.01, 0 .67, ton/fed. as fresh silage ,DM ,TDN and DCP, respectively. While, the feed balance (feed gap) was negative by-4201400.0 and-311599.0 as mentioned by Sheukry (2019).

Extracted results obtained from this study and another studies held by Srour *et al.* (2022) and Mahmoud *et al.* (2022) about feeding of lactating buffaloes maize silage and maize teosinte hybrid silage it was proposed three scenario .These scenarios aims to investigate the effect of introducing maize teosinte hybrid forage in the Egyptian agriculture crops rotation for silage production on the TDN, DCP yield and the feed gap at the national level. As shown in Table (8) the generalization of scenario (SI) at the national level could produce about 16.79, 4.68, 3.10 and 0. 208 million ton fresh MTC, DM, TDN, ere

DCP respectively, (based on the fresh yield).While DM, TDN and DCP of MTS were 54.16, 15.01, 10.01 and o.67 ton/fed, respectively). However, it could be contribute to solve Egyptian TDN and DCP gap by 73.88% and 66.67% respectively. Moreover, S1 can save cultivated maize silage of about 438547.0 fed. (Table 7) to produce grains which could be produced about 1.43 million ton grains it could covering about 15.05% of maize grain gap based on the yield of grain maize per fed. 3.24ton.That means reduction of imported maize grain by 1.43 million ton out of s 9.5 million ton at 2019 (Adbi and Wally 2019). Moreover, the output of applying S1 at the national level could be about 8.6 billon LE based on the price of one ton corn grain was 6000 LE (Alzira3a Com, 2021).

Table (7): Some economic and technical variables related to economic of using MTS at the national level.

Items	Estimated values
1- Corn fodder (drawa) area 2018-2019 fed.	310087.0
1-Total yield of fresh corn fodder (drawa) Ton	1965266.0
2- Av. DM yield of corn fodder(drawa) Ton	384013.0
2. Av. TDN yield of corn fodder(drawa) Ton	261512.0
2. Av. DCP yield of corn fodder(drawa) Ton	76880.26
6.Av. price of a TDN yield at the national level LE	2413956923.07
1-Av. summer and Nili area of maize silage (2018-2019) fed.	438547.0
3-Av. fresh yield of maize crop for a making silage (Ton)	9152475.89
Fresh silage yield	8235912.7
3-Av. DM yield of maize crop for silage Ton	2376924
3-Av. TDN yield of maize silage Ton	1534914.5
3-Av. DCP yield of maize silage Ton	118407.7
Av. price of TDN yield at the national LE	14168444922.9
Av. Fresh yield of MTS ton/fed	54.16
4- Av. DM yield of MTS ton/fed	15.10
4- Av. TDN yield of MTS ton/fed	10.01
4- Av. DCP yield of MTS ton/fed	0.67
5. Price of TDN yield (LE/fed)	92400.0
6-Av. feed gap as TDN/ton	-4201400
6-Av. feed gap as DCP/ton	-311599
1 - Average yield of maize grain ton/fed	3.24
Maize grain gap (imports for average of 2019-2-020) Ton	9.5 million
8. Price of one ton maize grain LE/ton	6000

1- Agric. Economic Affairs Sector, 2018-20192-According to APRI (1997*)*
3.4-Calculated from obtained results (Tables 1,4) 5-Gaafa (2001)

The data in Table (8) indicated also that the total expected increase of DM, TDN and DCP production at the national level by applying (S2) about 6622059.7, 4389855.5 and 2938826.5 ton, respectively. However it could be contribute to solve Egyptian TDN and DCP gap by 104.9 and 94.3% respectively. The 3rd scenario (combined analysis across the 1st and 2nd scenario) indicated that, replacing the whole drawa and maize silage area (748634.0 fed.) by MTS can achieve extra TDN and DCP at the national level about 7.49 and 0.50 million ton, respectively covering about 178.36 and 160.97% of total TDN and DCP, respectively along with increscent in the high quality feed resources which can be used for feeding high yielding cows by +3.29 and +0.19 million ton as TDN and DCP, respectively.

Table (8): Proposed scenarios used to reduce the feed gap by using MTS at the national level.

Items	Estimated values
S1:Replacement of corn fodder (drawa) area BY MTS	310087.0
Fresh yield(Ton)	16794311.9
Dry matter yield(Ton)	4682313.7
TDN yield (Ton)	3103970.9
DCP yield (Ton)	2077758.3
How much MTS solve TDN gap with S1	73.88%
How much MTS solve DCP gap with S1	66.67%
S2:Replacement MS area by MTS in the national level (fed)	438547.0
On fresh yield (ton)	23751705.52
On DM yield (ton)	6622059.7
On TDN yield (ton)	4389855.5
On DCP yield (ton)	293826.5
How much (MTS) can solve TDN gap with S2	104.9%
How much (MTS) can solve DCP gap with S2	94.30
S3:Replacement of drawa and MS area by MTS (fed)	748634.0
Fresh yield (ton)	40546017.4
DM yield (ton)	11304373.4
TDN yield (ton)	7493826.3
DCP yield (ton)	501584.78
How much MTS can solve TDN gap with S3	178.36%
How much MTS can solve DCP gap with S3	160.97%
With S_3: The feed balance would be for TDN (Ton)	+ 3292426.3
With S_2: The feed balance would be for DCP (ton)	+189985.8

S1: Scenario 1 S2: Scenario 2 S3: Scenario 3

CONCLUSION

1-Maize teosinte hybrid forge produced the highest yield of silage per fed compared with maize crop with similar fermentation characteristics and high quality silages.
2-The expected economic revenues of including MTF in the agriculture crop rotation are:
a- Egyptian feed gap could be reduced in the case of S1, S2 and S3 by 73.88,109.90 and178.36% for TDN and 66.67 ,94.30 and 160.97% for DCP respectively and covering about15.05% of maize grain gape.
b- Scenario 3 could be increase high quality feed resources which can be used for feeding high yielding cows by+3.29 and+.19 million ton TDN and DCP, respectively.

Challenges facing this application could be summarized in:

-Providing sufficient amount of maize teosinte hybrid seeds needed to cultivate the huge area.
-Providing a high efficiency agricultural machine for silage manufacturing.
-Introduce different kinds of round balers (big or mini) for making good silage and storage it in plastic bales instead of walled bunker silos.
-Training and guiding farmer on how to manufacturing and using of this new crop for silage production.

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التقييم الاقتصادي والغذائي لسيلجه هجين الريانه مقارنه بسيلاج الذره

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[4]قطاع الإنتاج، مركز البحوث الزراعيه، سخا، مصر.

تم زراعة ستة حقول بهجين محصول الذره واربعه بهجين الريانه لموسمين متتاليين تحت ظروف المزارع بشمال الدلتا بهدف تقييم العائد الاقتصادي والغذائي لسيلجه هجين الريانه مقارنه بسيلاج الذره وقد شملت هذه الدراسه تطبيق ثلاثه سيناريوهات لاستخدام سيلاج هجين الريانه في تغطيه الفجوه العلفيه من المركبات الغذائيه المهضومه والبروتين المهضوم وتقليل استيراد حبوب الذره في مصر.

وكانت اهم النتائج ان متوسط المحصول الأخضرللفدان علي أساس الطازج والماده الجافه لهجين الريانه اكبر مقارنه بمحصول الذره بدرجه معنويه عاليه حيث كان 60.18 و16.02 طن مقارنه ب20.87 و5.81 طن لمحصول الذره اما بالنسبه لسيلاج هجين الريانه فكان 54.16 15.10 طن مقارنه ب 18.78 و 5.42 طن لسيلاج الذره. لم يكن هناك فروق معنويه في التركيب الكيماوي للمحصولين فيما عدا الالياف الخام في السيلاج وقد سجل سيلاج هجين الريانه اعلي قيمه للمركبات الغذائيه المهضومه 66.28% مقارنه ب 64.61% واقل قيمه للبروتين المهضوم 4.48 مقارنه ب 4.92 مقارنه بسيلاج الذره دون فروق معنويه وكانت جوده السيلاج لكلا المحصولين عاليه وذو صفات تخمر مناسبه.

السيناريوهات المقترحه كانت :

1-إستبدال مساحات الدراوه بهجين الريانه. 2-إستبدال مساحات الذره بهجين الريانه . 3-إستبدال كل من مساحتى الدراوه والذره بهجين الريانه.

بتطبيق السيناريوهات الثلاث المقترحه فانه يمكننا تخفيض الفجوه العلفيه بالنسبه للمركبات الغذائيه المهضومه والبروتين المهضوم بنسبه 73.88 %و 66.67% وكذلك تقليل كميات حبوب الذره المستورده بمقدار 15.01% بالنسبه للسيناريو الاول وبنسبة 104.94 و 94.30% للسيناريوالثاني وبنسبة 189.29 ,171.28% للثالث للمركبات الغذائيه المهضومه والبروتين المهضوم على التوالى وفي نفس الوقت تزداد الموارد العلفيه عاليه الجوده من المركبات الغذائيه المهضومه والبروتين المهضوم والتى تصلح لتغذية الابقار عالية الادرار الى 3.29 + و 0.19+ مليون طن سنويا علي التوالي علي المستوي القومى.