IN VITRO STUDIES TO EVALUATE SUGAR BEET PULP UNTREATED, SUPPLEMENTED WITH UREA OR TREATED WITH FUNGUS AS A FEED INGREDIENT FOR RUMINANTS

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SUMMARY

Sugar beet pulp (SBP) is the by-product of sugar extracting industry from sugar beet. The crude protein content of SBP is 9.16% ±1.21. While it's In-vitro dry matter disappearance (IVDMD) is 58.85% ±0.76. Increasing the IVDMD and organic matter disappearance (IVOMD) of SBP either by fungus treatment (*Trichoderma Harzianum, T.H*) or supplementation with urea (2%) to in rich it's N content was the aim of this work. Three in-vitro experiments were conducted in this study. The objective of first experiment (EXP.1) was to determine the *IVDMD, IVOMD, In Vitro* crude protein disappearance (IVCPD) and in-vitro crud fiber disappearance (IVCFD) of SBP (T1), SBP plus media (2% urea, 1.5% ammonium sulphate, 1% live dry yeast, *saccharomyces Cerevisiae* and 0.5% magnesium sulphate as percentages of SBP, T2) and SBP plus media treated with *T.H* fungi, (T3). The results indicated that treatment with *T. H* (T3) was the most effective in increasing IVDMD, IVOMD, IVCPD and IVCFD above both T1 and T2. The figures were 63.97, 68.30 and 41.24% for IVDMD, IVOMD and IVCFD of T3. The respective values for T2 were 62.05, 64.70 and 36.45%, while the values for T1 (the untreated SBP) were 58.85, 62.87 and 34.98% for IVDMD, IVOMD and IVCFD, respectively. Differences among treatments in each nutrient were significant (P<0.01). The objective of second experiment (EXP.2) was to find out the best inclusion (level) proportion of USBP in the concentrate feed mixture contained 20% wheat straw (total mixed ration, TMR), that increase IVDMD and IVOMD. The third experiment (EXP.3) was to find out the best inclusion (level) proportion of SBP*T.H*. that increase IVDMD and IVOMD. The tested inclusion proportions were 0, 20, 40, 60, 80 and 100% SBP*T. H*. The results indicated that 40% inclusion level showed the best value for IVDMD 71.68% ±0.65 and 74.35% ±0.78 for IVOMD, while the respective values of 100% total mixed ration (TMR) were 68.39% ±0.65 and 71.86% ±0.78 for IVDMD and IVOMD, respectively. The differences were significant (P<0.01). The results showed that the 40% inclusion was the best level of USBP in the TMR. The IVDMD was 69.64% ±0.59, while the IVOMD was 72.68% ±0.76. While, the respective values for the concentrate feed mixture (100% TMR) were 67.53% ±0.59 and 71.19% ±0.76 for IVDMD and IVOMD, respectively. Differences were significant (P<0.01). It could be concluded that SBP*T. H* was the most effective treatment in improving both IVDMD and IVOMD of sugar beet pulp. The improvement achieved was 8.70% for IVDMD and 8.64% for IVOMD than the untreated SBP. The best inclusion level of SBP *T. H.* in the TMR was 40% as the improvement achieved above the TMR alone was 4.81% for IVDMD and 3.47% for IVOMD.

Keywords: *Sugar beet pulp, Trichoderma Harzianum, Saccharomyces cerevisiae, Urea and in-vitro technique.*

INTRODUCTION

In-vitro technique to evaluate the availability of animal feed ingredients for feeding ruminant is already documented. It has the advantage of giving the result in few days, using few grams of the sample, a comparison among several ingredients could be made in a shortest time and it does not need sophisticated laboratory equipment's. Telly and terry technique (1963) was one of these worldwide used techniques. Sugar beet pulp (SBP the by-product of extracting sugar from beet) is produced nowadays in greater amounts. The area cultivated with sugar beet is growing up to replace sugar can as a source of sugar for human consumption. It is also to reduce water used for irrigation. It represents 6.5% of sugar beet crop according to Essi and Ulrike (2017). It is fibrous by product that contains 14.76% crude fiber, 52.41% neutral detergent fiber (NDF), 34.63% acid detergent fiber. It is limited in crude protein content

(9.75%), while its total digestible nutrients were in the range of 60-72%, (Abd El-Fattah, 2013 and Greg Lardy 2016). Several methods were applied to increase the digestibility and the feeding value of Agro-industrial by products to diminish the gape of farm animal feeds (Ministry of Agriculture records 2016). Of these methods are supplementations of feed nutrients to cover the shortage being found in feed nutrient. Microbiological treatment to initially degrade the cell wall constituents of the product leading it more susceptible to ruminal microbial activity and fermentation is an alternative method for physical and chemical treatments (Mohamed and Hala, 2008, and Aly 2012). This study was conducted to examine the effect fungus plus media treatment on dry, organic matter, crude protein and crude fiber disappearance (EXP1). Urea supplementation (2%) of the product to enrich its N content was included in different levels of feed mixture (EXP. 2). Several inclusion levels of SBP (0, 20, 40, 60, 80 and 100%) treated with *T. H*. (SBP*T.H*.) in the total mixed ration were studied (EXP 3). This work is a preliminary study to evaluate the most effective method to improve the feeding value of SBP and the best inclusion level that would be applied on farm animals' nutrition (in-vivo) in the next work.

MATERIALS AND METHODS

The experimental work of the present study was carried out in the farm of Animal Production Department, Faculty of Agriculture, Minia University during the period of May 2014 to October 2014. This study was carried out in three experiments, to evaluate sugar beet pulp (SBP) as a feed ingredient. It was obtained from the Sugar and Integrated Industries Company in Abo korkas, Minia Governorate.

Experiment 1: *In-vitro* trial to study the dry matter (DM), organic matter (OM), crude protein (CP) and crude fiber (CF) disappearance (D) of SBP, SBP treated with media and SBP treated with *Trichoderma Harzianum* (*T. H.*) plus media.

Experiment 2: *In-vitro* trial to study the DMD and OMD of ureated SBP (2%USBP) when represent different proportions 0, 20, 40, 60, 80 and 100% of the concentrate feed mixture containing 20% wheat straw, performed as total mixed ration (TMR).

Experiment 3: *In-vitro* trial to study DMD and OMD of SBP treated fungi (*Trichoderma Harzianum*) plus media when represent different proportions (0, 20, 40, 60, 80 and 100%) of TMR.

Proximate analysis and fiber fractions of sugar beet pulp:

Sugar beet pulp (SBP) was analyzed for (DM), (CP), ether extract (EE), (CF) and ash according to (A.O.A.C., 2006). Determinations of fiber fractions (neutral detergent fiber (NDF), acid detergent fiber (ADF), acid detergent lignin (ADL) of the tested rations were carried out according to Van Soest *et al.* (1991). Cellulose and hemicellulose (H-cellulose) values were calculated by difference.

Hemicellulose = (NDF - ADF), while Cellulose = (ADF -ADL).

Microbiological treatment (fungal treatment):

Fungal strain (*Trichoderma harzianum*) and Yeast strain (*Saccharomyces Cerevisiae*) were obtained from the Genetic Department and Microbiological Department, Faculty of Agriculture, Minia University. The microorganisms (fungi) and (yeast) were maintained on Potato dextrose agar (PDA) media. Four days old fungal culture in test tubes was used in treatment.

Basal media composition:

The basal media contain (2% urea, 1.5% ammonium sulphate, 0.1% live dry yeast (*Saccharomyces Cerevisiae*) and 0.5% magnesium sulphate) as percent of SBP weight were dissolved in distilled water (twice the weight of SBP that would be treated.

Citrate buffer 0.5 mole:

21 grams of citric acid dissolved in one liter of distilled water and 29.4 grams of sodium citrate in another liter of distilled water. Mix 82 milliliters of the citric acid solution with 18 milliliters of the sodium citrate solution. Use one mole (M) sodium hydroxide solution to adjust the pH of the mixture to 6.0. After that, make the final volume of the solution (citrate buffer) up to one liter with distilled water in a volumetric flask.

Treatment of SBP with Trichoderma harzianum:

Use six 1-liter capacity flasks containing 50gm sugar beet pulp each. Moisten the SBP with basal media at solid (SBP): liquid ratio 1: 2 with basal media. Citrate buffer 0.5 M was used to adjust the liquid phase pH values in the range of 5.0 to 6.0. The flasks were sterilized by autoclave at 121 ^{o}C for 20 minutes. After being cooled, flasks were inoculated with T. Harzianum (T.H.). The inoculum of (T.H.) was taken from slant culture in test tube. It was dipped in 10 ml sterilized PDA and used to inoculate the experimental flasks at 10% (V/W) of SBP weight. While live dry yeast (*Saccharomyces Cerevisiae*) was inculcated at 0.1% of SBP (50gm) after three days from initial incubation with T.H in incubator at 30 ^{o}C for 7days, (Sherien, 2005 and Abd El-Maged, 2006).

In Vitro procedure:

In vitro technique was used to determine the DM and OM disappearance of SBP, USBP and SBP treated with fungi plus media, according to Tilley and Terry, (1963) technique after modification (Manual of laboratory techniques, University of Nebraska, Animal Production Department1986).

Calculation:

$$\text{DM disappearance, (IVDMD \%)} = \frac{[\text{ISW.DM} - (\text{residualsw.(DM)} - \text{residualDM, of blank tube})]}{\text{ISW(DM)}} X 100$$

$$\text{OM disappearance, (IVOMD \%)} = \frac{[\text{ISW.OM} - (\text{residualsw.(OM)} - \text{residualOM, of blank tube})]}{\text{ISW.OM}} X 100$$

ISW= initial sample weight. SW= sample weight.

Table (1): Components of the total mixed ration mash (TMR) used in *In Vitro* experiments.

Ingredients	Wheat bran	Crushed yellow corn	Soybean meal	Wheat straw	Lime stone	Sodium chloride
%	40	22	15	20	2	1

Statistical analysis of in vitro experiments:

Experiment (1) Complete Randomized Design (CRD) was followed. Statistical analyses of the data were performed by application the least squares procedure described in SAS (2003) as follows:

$Y_{ij} = \mu + T_i + e_{ij}$ Where, Y_{ij} is the observation of In-Vitro (DM, OM, CP and CF) disappearance of different nutrients. μ= is the overall mean. T_i= is the treatment effect where i= T1, T2 and T3 in the (*in-vitro*) trial SBP, SBP plus media and SBP *T.H.* plus media. e_{ij} = the experimental error (O, δ^2).

Experiment (2 and 3): Complete Randomized Design was followed. Statistical analyses of the data were performed by application the least squares procedure described in SAS (2003) as follows:

$Y_{ij} = \mu + T_i + E_{ij}$. Where, Y_{ij} is the observation of *In-vitro* DM and/or OM disappearance of different treatments. μ = is the overall mean. T_i = is the treatment effect where $_i$ = T1, T2, T3, T4, T5 and T6 in the (*in-vitro*) trial where rations contained different proportions of USBP or *SBP T.H.* plus media. e_{ij} = the experimental error (O, δ^2).

RESUITS AND DISCUSSION

Nutritional analysis of (TMR) and sugar beet pulp (SBP) used in this study:

The nutritional analysis of total mixed ration (TMR = 80% concentrate feed mixture (CFM) + 20% Wheat straw), air dried sugar beet pulp (ADSBP), SBP treated with media (SBP+M) and SBP treated *Trichoderma Harzianum* with media (SBP+M+ *T.H*) are elucidated in Table (2). Data indicated that SBP+M +*T. H.* contained the highest level of (CP) 20.30%, the lowest content of (CF) 16.58 %, (NDF) 38.24%, (ADF) 22.82%, cellulose 18.33% and hemi-cellulose 15.42% as compared with SBP. SBP contains CP 9.16%, CF 22.27%, EE 1.06%, NFE 63.18, NDF 48.11%, ADF 26.94%, (ADL) 3.49%,

cellulose 23.45% and hemicellulose 21.16%. Sugar beet pulp (SBP) has the highest levels of CF, NFE, NDF and hemicellulose compared with other treatments. While, SBP treated with media (SBP+M) contained CP 13.35%, CF 18.40%, EE 1.02%, NFE 61.97%, NDF 47.46%, ADF 28.02%, ADL 3.76%, cellulose 24.25% and hemicellulose 19.44%. The nutritional analysis of TMR showed that it's CP content was 15.30 %, 18.30% CF, 5.82% EE, 51.64% NFE, 44.96% NDF, 26.10% ADF, 5.59% ADL, 20.51% cellulose and 18.88% hemicellulose. Differences among treatments were significant (P<0.01) in each nutrient (Table, 2).

Table (2): Nutritional analysis of TMR, SBP, SBP+M, USBP and SBP+M+T.H.

Item	Treatments				± S.E	Sig.
	TMR	SBP	SBP+M	SBP+ M +*T. H*		
DM	92.97^{a}	90.46^{b}	88.22^{c}	88.62^{c}	0.58	**
On DM basis						
OM	91.04^{b}	95.67^{a}	94.73^{a}	92.32^{b}	0.57	**
CP	15.30^{b}	9.16^{d}	13.35^{c}	20.30^{a}	1.21	**
CF	18.30^{b}	22.27^{a}	18.40^{b}	16.58^{c}	0.63	**
EE	5.82^{a}	1.06^{b}	1.02^{b}	1.13^{b}	0.62	**
NFE	51.64^{b}	63.18^{a}	61.97^{a}	54.31^{b}	1.49	**
NDF	44.96^{b}	48.11^{a}	47.46^{a}	38.24^{c}	1.18	**
ADF	26.10^{b}	26.94^{b}	28.02^{a}	22.82^{c}	0.59	**
ADL	5.59^{a}	3.49^{c}	3.76^{c}	4.49^{b}	0.24	**
Cellulose	20.51^{b}	23.45^{a}	24.25^{a}	18.33^{c}	0.72	**
Hemiecellulose	18.88^{c}	21.16^{b}	19.44^{c}	15.42^{d}	0.63	**
Ash	8.96^{a}	4.66^{c}	5.27^{c}	7.68^{b}	0.53	**

DM= Dry matter. OM= Organic matter. CP= Crude protein. CF= Crude fiber. EE= Ether extract. NFE= Nitrogen free extract. NDF= Neutral detergent fiber. ADF= Acid detergent fiber. ADL= Acid detergent lignin.

Treatment with fungus that secrete enzymes like as cellulases, hemicellulases, legninases that destruct the cell wall structure became nowadays an acceptable method to improve the feeding value of roughages, forages, farm and plant crop wastes (Sherien 2005, Abd El-Maged 2006, Aly et al., 2012 and Abd El-Fattah 2013). Treatment of such product with fungus includes preparation of media to activate and/or accelerate growth of fungus hyphae's and mycelium before incubation. Media used in this study contains urea, ammonium sulfate and active dry yeast (Sherien 2005 and Abd El-Maged 2006). These nitrogenous components increased the crude protein content of SBP plus media up to 13.35%, while after incubation at room temperature the SBP, media and fungus growth (SBP+M+*T. H*.) increased the CP content up to 20.30% (Table, 2). This obvious increase in CP content could be explained in view of the reduction in (CF), (NFE), (NDF) and (ADF) concentrations; therefore the increase of CP in SBP+M+*T. H*. is of mathematical contention

In Vitro dry matter and organic matter disappearance of sugar beet pulp (SBP), SBP+M and SBP+M+T. Harzianum:

The *In vitro* dry matter disappearance (IVDMD) results of SBP, SBP plus media (SBP+M) and SBP treated with media and fungi (SBP+M+*T. H*.) are displayed in Table (3). The values ranged from 58.85% to 63.97%. The lowest value was for SBP, while the highest value was for SBP+M+*T. H*. The IVDMD of SBP+M was 62.05%. Differences among treatments were significant (P<0.01). The *in-vitro* organic matter (IVOMD) figures of SBP, SBP+M and SBP+M+*T. H.* were 62.87, 64.70 and 68.30%, respectively. The *in-vitro* crude protein disappearance (IVCPD) of the tested treatments was 65.37, 62.35 and 51.34% respectively for T1, T2 and T3. The highest value was 65.37% for SBP, while the lowest value was 51.34% for SBP+M+*T. H*. The *In Vitro* crude fiber disappearance (IVCFD) of untreated sugar beet pulp (T1) and SBP+M (T2) and SBP+M+*T. H*. (T3) were 34.98 and 36.45 and 41.24% for T1, T2 and T3, successively. The differences among treatments were significant (Table, 3). The IVDM, IVOM, IVCP and IVCF disappearances are indicators of these nutrients building-up and availability to be dissolved and digested by rumen microbes and pepsin enzyme. It is also accepted that if the cell wall constituents being less condensed, cracked, crushed or dissociated, the cell soluble will be available for microbial enzymes activity and fermentation. There is a lot of references that fungal treatment either

Trichoderma sp., Aspargillus sp. and Phanerochaete Chrysosporium render the treated crop residue more digestible and having better feeding value (Mohamed *et al.*, 2008, Ghoneem 2010, Abdel-Azim *et al.*, 2011 and Aly *et al.*, 2012). Results in Table (3) could be explained in this sense. The *in-vitro* DMD was increased by 8.7%, the in-vitro OMD was increased by 8.6% and *in-vitro* CFD jumped up by 17.90% as SBP was treated with *T. H*. On the contrary the *in-vitro* CPD went backword 14.03 percentage unite that resemble depression of 21.46%. This means that the protein content of SBP that have disappearance value of 65.37% was changed to a great extent to fungal crude protein that contain nucleic acids that is undigested or poorly digested (El-Badawi *et al.*, 2003, Sherien 2005 and Saleh 2007).

Table (3): *In Vitro* dry matter, organic matter, crude protein and crude fiber disappearance for SBP, SBP + M and SBP + M+ T. *H*.

Item	Treatments			±S.E	Sig.
	SBP (T1)	SBP+M (T2)	SBP+M+*T. H*. (T3)		
IVDMD	58.85^{c}	62.05^{b}	63.97^{a}	0.76	**
IVOMD	62.87^{b}	64.70^{b}	68.30^{a}	0.80	**
IVCPD	65.37^{a}	62.35^{a}	51.34^{b}	2.13	**
IVCFD	34.98^{b}	36.45^{b}	41.24^{a}	0.95	**

***SBP+M** = sugar beet pulp plus media. **SBP+M+T. H.** = sugar beet pulp plus media with Trichoderma Harzianum. **IVDMD** = in-vitro dry matter disappearances. **IVOMD** = in-vitro organic matter disappearance. **IVCPD** = in-vitro crude protein disappearance. **IVCFD** = in-vitro crude fiber disappearance. (**) = Significant different at (P<0.01). Means in the same row with different superscripts **a, b** and **c** is significantly different.*

***In-vitro* DM and OM disappearance of rations contained different levels of SBP plus 2% urea (2%USBP):**

Data presented in Table (4) indicated that IVDMD of rations contained different proportions of SBP plus urea (2%USBP) ranged from 62.81% to 69.64%. The highest value was for ration contained 40% USBP while, the lowest value was for 100% USBP ration. The IVDMD values of rations contained 0 (control), 20, 60 and 80% USBP were 67.53, 67.59, 68.68 and 64.30%, respectively. Differences among treatments were significant (P<0.01) except the difference between 0 and 20% USBP, where it was not significant (Table 4). The IVOMD of rations contained different proportions USBP ranged from 64.36 to 72.68%, the highest value was for 40% USBP ration, while the lowest value was for 100% USBP ration. The IVOMD of rations contain 0, 20, 60 and 80%USBP were 71.19, 71.70, 70.32 and 65.84%, respectively. Differences among treatments were significant (P<0.01) except the difference among 0, 20 and 40% USBP, where it was not significant (Table 4). The third treatment (40% USBP) achieved the best results in both dry and organic matter *in-vitro* disappearances.

Table (4): *In vitro* DM and OM disappearance of rations containing (0, 20, 40, 60, 80 and 100% USBP).

Item	Treatments						± SE	Sig.
TMR%	100	80	60	40	20	0		
USBP %	0	20	40	60	80	100		
IVDMD	67.53^{b}	67.59^{b}	69.64^{a}	68.68^{a}	64.30^{c}	62.81^{d}	0.59	**
IVOMD	71.19^{ab}	71.70^{a}	72.68^{a}	70.32^{b}	65.84^{d}	64.36^{d}	0.75	**

IVDMD = in-vitro dry matter disappearances. IVOMD =in vitro organic matter disappearances.

TMR = the total mixed ration (concentrate feed mixture containing 20% wheat straw.

(**) = Significant different at (P<0.01). Means in the same row with different superscripts a, b, c, d and e are significantly different.

In-vitro DMD and OMD of rations contain different proportions of SBP+M+T.H:

Data presented in Table (5) indicated that IVDMD of rations contained different proportions of SBP treated with *Trichoderma Harzianum* (SBP+M+*T. H*) ranged from 64.27% to 71.68%, the highest value

was for ration contained 40% SBP+M+*T. H.* while, the lowest value was for 100% SBP+M+*T. H.* ration. The IVDMD value of rations contained 0 (control), 20, 60 and 80 SBP+M+*T. H.* % was 68.39, 70.15, 67.71, and 64.82%, respectively. Differences among treatments were significant (P<0.01) except the difference between 80 and 100 SBP+M+*T.H.*, where it was not significant. The IVOMD value of rations contained different proportions of SBP*T. H*. ranged, from 65.90 to 74.35%, the highest value was for 40% SBP+M+*T. H.* ration, while the lowest value was for 100% SBP+M+*T. H*. ration. The IVOMD of rations contained 0, 20, 60 and 80% SBP+M+*T. H.* was 71.86, 73.36, 69.98 and 66.51%, respectively. Significant differences among treatments were found (Table 5). The third treatment (40% SBP+M+ *T. H*.) achieved the best results in both dry and organic matter in *In Vitro* disappearances. The enhancement above 100% control rations was 4.81% for IVDMD and 3.47% for IVOMD. While, the improvement above 100% SBP+M+*T. H*. was 11.53% for IVDMD and 12.82 % for IVOMD. These results could be elucidated in view of the nutrient composition of the whole (concentrate feed mixture and USBP or SBP+M+*T. H*.). The differences among treatments were significant (P<0.01) concerning IVDMD and IVOMD (Table, 5). The compatibility of these components to each other and the synergistic effect upon each other do its role. This is true as the IVDMD value of 100% control (concentrate feed mixture) was 68.39% while, the value of IVDMD for 40% inclusion level was 71.68% which is greater by 4.81%. This means that SBP+M+*T. H.* add value to the CFM. In this way it is expected that 100% SBPT. H. should have greater value than the 40% SBP+M+*T. H.* inclusion level. Unfortunately this is not the case as the value for 100% SBP+M+*T. H* was 64.27% which is 10.34% less than 40% inclusion level (Tables 4 and 5). Even-though the IVDMD or IVOMD values of SBP+M+*T. H.* was greater than USBP values, the variation could be explained as the CF, NDF, ADF and ADL (cell wall constituents) concentrations which were greater for USBP than SBP+M+*T. H*. (Table 2). It is generally well known that as the cell wall constituents were increased the digestibility values were decreased. In other words cell wall constituents' digestibility is lower than digestibility of cell soluble constituents, (McDonald *et al.*, 2010).

Table (5): *In-vitro* DM and OM disappearance of ration containing (0, 20, 40, 60, 80 and 100% SBP+M+*T. H.*)

Item	Treatments							
TMR%	100	80	60	40	20	0	± S.E	Sig.
SBP+M+*T.H.* %	0	20	40	60	80	100		
IVDMD	68.39^{c}	70.15^{b}	71.68^{a}	67.71^{c}	64.82^{d}	64.27^{d}	0.65	**
IVOMD	71.86^{b}	73.36^{ab}	74.35^{a}	69.98^{c}	66.51^{d}	65.90^{d}	0.78	**

TMR = Total mixed ration (concentrate feed mixture containing 20% wheat straw). SBPT.H = SBP+M+ T. H.

*** Significant different at (P<0.01). Means in the same row with different superscripts a, b, c, d and e are significantly different.*

It could be concluded that SBP treated with fungus *Trichoderma Harizanum* was the most effective treatment in increasing dry matter, organic matter and crude fiber disappearances and its inclosing in the total mixed ration up to the level of 40% was the best level from nutritional point of view.

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دراسات معملية لتقييم لب بنجر السكر المضاف اليه 2% يوريا او المعامل بالفطر كمكون غذائي فى المجترات

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تمت هذه الدراسة فى معامل قسم الانتاج الحيواني كلية الزراعة حيث استخدم لب بنجر السكر كناتج ثانوي من عمليات استخلاص السكر من بنجر السكر فى مصانع السكر بابوقرقاص بمحافظة المنيا.

تهدف الدراسة الى محاولة تحسين القيمة الغذائية للب بنجر السكر من خلال اضافة اليوريا بنسبة (2%) لزيادة محتواه من البروتين الخام وكذلك من خلال معاملته بفطر الترايكودرما. وتم تقدير القيمة الغذائية بواسطة معدل اختفاء المادة الجافة والعضوية وكذلك معدل اختفاء الالياف الخام والبروتين الخام للب بنجرالسكروتحديد افضل نسب احلال من العلائق المستخدمة فى تغذية الحيوان. وقد تمثلت اهم النتائج فيما يلى:

- أظهرت نتائج التحليل الغذائي لكلا من العليقة الكنترول ولب البنجر الغير معامل أو المعامل بالبيئة أو المعامل (بالبيئة والفطر) تفوق لب البنجر المعامل (بالبيئة والفطر) فى البروتين الخام وانخفاض فى الالياف الخام والسليولوز .
- كانت معاملة لب بنجر السكر بكلا من البيئة والفطر معا أفضل من لب البنجر بمفردة او اللب المعامل بالبيئة بدون الفطر فى معدل اختفاء المادة الجافة والمادة العضوية والالياف الخام المختفية .
- كانت افضل نسبة احلال من العليقة الضابطة بلب بنجر السكرالمضاف اليه (2%يوريا) عند نسبة 40% لب بنجرمعامل باليوريا و 60% عليقة كنترول .
- كذلك كانت افضل نسبة احلال من العليقة الضابطة بلب بنجر السكرالمعامل بالبيئة والفطر هى 40% لب بنجر معامل و 60% عليقة كنترول

ويستخلص من هذه الدراسة انه يمكن استخدام لب بنجر السكر المعامل بالفطر والبيئة بنسبة (40%) احلال من العليقة الكنترول فى تغذية المجترات من خلال معدل اختفاء المادة الجافة والعضوية والالياف الخام .