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الاستفادة من بعض النباتات المستنبتة بدون تربة فى تغذية الأرانب

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الملخص العربي

تهدف هذه الدراسة الي تقييم امكانية استخدام نبتة حبوب الشعير او بذور الحلبة علي قش الارز وإدخالها لمنتج في علائق الارانب النامية كبديل لدريس البرسيم. استخدم في هذه الدراسة عدد ٦٠ ذكر ارنب نيوزيلندي ابيض نامي في عمر ٧ اسابيع بمتوسط وزن (١١٣٨ ± ٣٢) جرام قسمت عشوائيا الي ٦ مجموعات وكل مجموعة الي ١٠ ارانب نامية في مكررين بكل خمسة . غذيت علي ٦ علائق تجريبية . عليقة الكنترول وعدد ٥ علائق اخري تحتوي علي نبتة الحلبة او الشعير النامي علي قش الارز ومخلوطهما بنسب (صفر ، ٧، ١٤، ٢١، ٢٨%) بالاحلال مع دريس البرسيم في عليقة الكنترول وذلك لمدة ١٠ اسابيع . لبحث تأثير هذه العلائق التجريبية علي كل من: النمو – كمية المأكول – الكفاءة الغذائية – معاملات الهضم والقيم الغذائية وميزان النيتروجين.

ويمكن تلخيص نتائج هذه الدراسة فيما يلى:

سجلت مجموعة الارانب المغذاة علي العليقة المحتوية علي (٢٨% نبتة حلبة اعلي معدل زيادة في الوزن يليها التي تغذت علي العليقة المحتوية على ٢٨%نبتة الشعير ثم عليقة الكنترول بينما كانت اقل المجموعات زيادة في الوزن التي تغذت علي العليقة المحتوية علي مخلوط (٢١% نبتة حلبة +٧% نبتة شعير).وكانت كمية الغذاء المستهلك خلال فترة التجربة كانت اقل في المجموعة التي تغذت علي العليقة المحتوية علي مخلوط(٢١% نبتة حلبة +٧% نبتة شعير) يليها المجموعة التي تغذت علي العليقة المحتوية علي مخلوط(٢٨% نبتة حلبة) تليها المجموعة التي تغذت علي العليقة المحتوية (٧% نبتة حلبة +٢١% نبتة شعير) بينما اكثر المجموعات استهلاكا للغذاء كانت المجموعة التي غذيت علي العليقة المحتوية علي مخلوط

(١٤%حلبة+١٤%شعير) مقارنةً بمجموعة الكنترول.كما اظهرت مجموعة الارانب التي تغذت علي العليقة المحتوية علي (٢٨% نبتة حلبة) اعلي كفاءة تحويل غذائى بينما كانت اقل المجاميع للتحويل الغذائي هي التي تغذت علي المخلوط (١٤% حلبة+١٤% شعير).كما اظهرت نتائج معاملات الهضم ارتفاع معاملات الهضم للمادة العضوية والبروتين الخام، المستخلص الخالي من النيتروجين في جميع المعاملات المحتوية علي نسبة كل من الحلبة والشعير او مخلوطهما مقارنة بدريس البرسيم بينما ارتفع معامل هضم الالياف ارتفاعا فى جميع المعاملات التجريبية مقارنة بدريس البرسيم وكان اعلاها في المعامله الثانية (٢٨% نبتة الحلبة) .بينما كانت القيمة الغذائية في العلائق التجريبية في صورة المركبات الغذائية المهضومة والبروتين المهضوم أعلي عن العليقة المقارنة .المحتجز النيتروجيني كان موجب في كل المجاميع المغذاة علي العلائق التجريبية وقد اظهرت المجاميع المغذاة علي العلائق المحتوية علي (٢٨%نبتات حلبة) ،(١٤% نبتات حلبة+١٤% نبتات شعير) ،(٢٨% نبتات شعير) اعلي محتجز نيتروجيني مقارنة بالكنترول والعلائق الاخري.

يستنتج من هذا البحث: أنة باستخدام كل من بذور الحلبة وحبوب الشعير كجزء من عليقه الأرانب أدى إلى رفع القيمة الغذائية و الكفاءة التحويلية دون حدوث أى أضرار على النمو.

UTILIZATION OF SOME HYDROPONIC PLANTS IN RABBIT FEEDING

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ABSTRACT: ***This study was carried out to investigate the possibility of using of vegetated fenugreek seeds and /or barley grains on rice straw as a bedding material in growing rabbits diet. A total number of sixty growing New Zealand White (NZW) rabbits at 7- weeks of age (with an average weight 1138 ± 32g) randomly divided into 6 equal groups, 10 for each in 2 replicates. Rabbits were fed control diet and 5 experimental diets contained hydroponically sprouted fenugreek seeds(SF) or/ and hydroponically sprouted barley grains(SB) and their mixtures replacing with clover hay. The experimental diets were fed for 10-weeks.The result showed that: rabbits fed D2 and D6 (28% SF and 28% SB) recorded the highest body weight gain 1370 and 1325g, respectively compared with 1320g for control. Feed intake was the lowest for D3 and D2 which contained 21% and 28% SF, respectively . while D4 (14% of each SF and SB mixture) was the highest total feed intake. Rabbit fed D2 (28%SF) recorded the better feed conversion followed with D6 (28%SB). The nutritive value as TDNand DCP was improved in D6,D2andD5 respectively,.Nitrogen balance were positive in all diets, D2 and D6 had the highest nitrogen balance value.***

Key words: ***Hydroponic, Barley, Fenugreek, Rice straw, Digestibility, Growth performance,rabbits***

INTRODUCTION

Hydroponically sprouted grains (barley) and legume seeds (fenugreek) increased CP, CF, ash, minerals, and vitamins contents (Morgan *et al.* 1992). A marked increase in both NPN and free amino acid as well as in-vitro digestibility and anti nutritional factors (namely trypsin inhibitor and hemoglutin). Vegetating some seeds or grains on some agricultural by-

products is a type of hydroponics without soil which include water culture or sand culture or gravel culture or any agricultural by-products (rice straw) as bedding material, whereas these by-products have the ability to save water for long time which enough to success the vegetation process. And the efficient use of water by the production of hydroponic fodders of barley and other plants(Bustos *et al.* 2002).

The objective of this study is to evaluate the effect of vegetation process on chemical composition, digestibility and nutritive value of rice straw as a bedding material and to study ability to replacing clover hay by the sprouted barley grain and sprouted fenugreek seeds in growing rabbit's diet.

MATERIALS AND METHODS

Preparing of hydroponicaly- sprouted plants:

Rice straw , as the bedding material was chopped (2-4cm) and soaked in water for one hr, also two type of vegetation as barley grains , fenugreek seeds were soaked in the same time for 24 hrs to use. The soaked rice straw was furnished as a bedding material .Barley grain and fenugreek were vegetated on this bedding as ratio 1:1.5 fenugreek seed or barley grain and rice straw, respectively. The growing time of hydroponic plants takes as little as 15 days from seed germination to a fully grown plant as at a height of 20 – 25 cm ready for harvest. Then the sprouted of hydroponic plant complete were dried turned up manually till complete dryness and analysis .The chemical composition of the sprouted hydroponically plants shown in Table 1.

Formulation of the experimental diets:

Six experimental diets (one served as control and five diets contained five hydroponically (sprouted barley grain and/or fenugreek seeds and their mixtures) which were replaced with clover hay (Table 2). The diets formulated according to NRC (1977).

Experimental animals:

A total number of sixty males New Zealand White (NZW) rabbits at 7 weeks of age (average body weight1138±32g). Rabbits were randomly divided into 6 equal groups, 10 for each in 2 replicates.

Feeding trial:

Rabbit were housed in galvanized wives cages batteries and kept under the similar managerial conditions . Diets were offered to rabbit ad libtium and fresh water was automatically available all time. Live body weight and feed consumption were recorded weekly. Feed conversion ratio (FCR) was also determined.

Digestibility trails:

Six digestibility trial were carried out. At the termination of feeding period eighteen adult males growing apparently healthy New Zealand White (NZW) rabbits of four month old ware taken and assigned into 6 groups 3 males each. The rabbit were housed individually in digestibility cages. They were fed the experimental diets for 2-weeks. The composition and the chemical analysis of the experimental diets presented in Tables (1 and 2). Quantitative collection of feces and urine started 24 hrs after feeding for later determination of N content.

Proximate composition:

Proximate analysis of diets, feces and urine contents were carried out according to AOAC (2000). Digestible energy (DE) were calculated according to Cheeke (1987). The fiber fraction of the experimental diets were determined according to Goerging and Van Soest (1970).

Statistical analysis:

Data were statistically analyzed according to SAS (1999). The significant differences between means were tested by using Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

Chemical composition:

The chemical composition of clover hay (CH), sprouted barley grain(SB) and sprouted fenugreek seeds (SF), with or without rice straw as bedding material presented in Table (1). It is clear that, replacing clover hay with SB and SF germinated on straw with different ingredients used by different ratio to formulate the six experimental diets to get balanced diet for growing rabbits (Table 2 and 3). The values of the proximate analysis of the experimental diets showed iso-caloric and almost iso-nitrogenous values. Crude protein was ranged from (17.95 to 18.15) %, and digestible energy was ranged from (2401 to 2470): Kcal/Kg diet .

Table 1. The chemical composition of clover hay, sprouted barley grain(SB) and sprouted fenugreek seeds(SF) , with /or without rice straw as bedding material (on DM basis):

Item	CH%	SB%	SF%	SB+BS%	SF+BS%
OM	٨٨.٩٤	٨٧.٢٣	٨٨.١٨	٨٨.٥٠	٩٠.٥٠
CP	15.46	15.38	٢٦.٢٥	٩.١٩	١٨.٣٨
CF	27.81	٢٠.٢٥	١٦.٨٤	٢٤.٥٠	٢٦.٢٢
EE	1.82	١.٧٠	١.٥١	١.١٠	٠.٧٦
NFE	٤٣.٨٥	٤٩.٩٠	٤٣.٥٨	٥٣.٧١	٤٥.١٤
Ash	١١.٠٦	١٢.٧٧	١١.٨٢	١١.٥٠	٩.٥٠

*Cell wall constituents:					
NDF	**52.56**	٤٢.٢١	٣٨.٨٦	٦٠.٢٧	٦٣.٦٠
ADF	**35.12**	٢٧.١٩	٢٢.٠٦	٣٨.٩٤	٣٦.٠٥
ADL	**5.75**	٥.١٢	٤.٨٠	١١.١٤	٩.٧٦
H.Cellulose	**17.44**	١٥.٠٢	١٦.٨٠	٢١.٣٣	٢٧.٥٥
Cellulose	**29.37**	٢٢.٠٧	١٧.٢٦	٢٧.٨٠	٢٦.٢٩

CH = clover hay ,SB = sprouted barley , SF= sprouted fenugreek ,BS=bedding straw,CF=crude fiber . *NDF: Neutral detergent fiber; ADF: Acid detergent fiber; ADL: Acid detergent lignin; Hemi cellulose = NDF – ADF; Cellulose = ADF – ADL

Table 2. Formulation of the experimental diets* .

Ingredients	Control	28%SF	21%SF +7%SB	14%SF +14%SB	7%SF +21%SB	28%SB
	D1	D2	D3	D4	D5	D6
Clover hay (CH)	28	-	-	-	-	-
Hydroponically sorouted fenugreek(SF)	-	28	21	14	7	-
Hydroponically srouted barley(SB)	-	-	7	14	21	28
Wheat bran	28	37	35	35	30	25
Barley	20	15	15	15	15	15
Soybean meal (44%CP)	12	15	15	15	18	20
Yellow corn	10	3	5	5	7	10
Limestone	1	1	1	1	1	1
NaCl	0.5	0.5	0.5	0.5	0.5	0.5
Vit & Min. premix**	0.5	0.5	0.5	0.5	0.5	0.5
Total	100	100	100	100	100	100
Price of 1kg feed (PT)***	145	130	120	117	115	110

*** Calculated according to NRC (1977).**

**** Each one kg of vitamin & mineral mixture contains: Vit.A 4000000 IU; Vit D_3 50000IU; Vit E 16.7g.; Vit K_3,0.67g.; Vit.B_1 67g; VitB_2 2.00g; Vit. B_6 0.67g; Vit B_{12} 3.33mg ; Cholin chloride 400g.; Biotin 0.07g ;Niacin 16.7g.; pantothenic acid 6.7g; Folic acid 1.7g;; Copper 1.7g; Iron 25.00g; Manganese 10.00g; Iodine 0.25g; Selenium 33.3g; Zinc 23.3g and Magnesium 133.3g.**

***** According to the local prices of these ingredients at the experiment time (during 2005).The prepared diets were iso- nitrogenous ,iso- caloric and had nearly equal level of CF.**

Table 3. The chemical composition of experimental diets on DM basis:

Item	D1 (control)	D2	D3	D4	D5	D6
DM	%٩١.٠٠	%٨٩.٠٠	%٨٨.٠٠	%٨٨.٩٠	%٩٠.١٠	%٩١.٠٠

On Dry matter basis(%)						
OM	٨٦.٩6	٨٥.08	٨٥.١٩	٨٥.٢٣	٨٥.٥٧	٨٦.٧١
CP	١٨.١١	١٨.١٥	١٨.٠٨	١٨.0٥	١٨.00	١٧.٩٥
CF	١٤.٦٩	١٥.٦٣	١٦.٧٤	١٤.٩٩	١٤.٩٨	١٥.٢١
EE	٧.٢٤	٥.٨٨	٦.٨٢	٦.٥٦	٦.٩٨	٦.٣٦
NFE	٤٦.٩٢	٤٦.٠٢	٤٣.٥٥	٤٥.٦٣	٤٥.٦١	٤٧.٢٠
Ash	١٣.٠٤	١٤.٣٣	١٤.٨١	١٤.٧٧	١٤.٤٣	١٣.٢٩
***DE(Kcal/gm diet)**	**2470**	**2440**	**2401**	**2452**	**2457**	**2451**

***DE(Kcal/g)=4.36-0.0491xNDF%&.NDF,%=28.924+0.657xCF%. Cheeke (1987)**

Growth performance:

Average of live body weight and gain:

Data in Table (4) indicated the effect of replacing of clover hay with sprouted fenugreek seeds or sprouted barley grains and their mixture on rabbit growth performance. The initial body weight was 1138 ± 32g.The average live body weight (LBW) and live body weight gain (LBWG) after 2 weeks from the beginning of the experiment showed that D2 contained 28%SF was the highest in LBW at all. The final body weight and weight gain of rabbit fed D2 was higher than the other groups. Data presented in (Table 4) showed that substitution of CH (Control ,D1)with SF and SB vegetated on rice straw at the level of 28%SF and 28%SB of the diets D2 and D6, respectively were comparable to D1 in total weight gain ,being(1370 and 1325) vs. 1320g.

Fathia Ibrahim *et al.* (2001) and Haiam Abd El-Nabi (2007) indicated that feeding lambs with vegetated barley recorded higher gain than lambs fed barley grains without vegetation. On other hand ,there was a decrease in total weight gain by feeding rabbits D3 and D5 by 20.1 and 15.8%, respectively compared with rabbits fed D1 as control diet (Table4). This decrease may be due to lower feed intake in D3 and D5 being 5179.57 and 5559.20 g respectively, vs. 4.48 for group D1.

Table 4. Growth performance as affected by using sprouted Fenugreek (SF),sprouted barley (SB), and their mixture Means ± SE).

Item	Control D1	28%SF	21%SF+ 7%SB	14%SF+ 14%SB	7%SF+21 %SB	28%SB	Sig.
		D2	D3	D4	D5	D6	
Initial weight (g)	1127.50 ± 34.82	1117.5 ± 11.19	1133.5 ± 41.77	1147.0 ± 32.74	1179.50 ± 32.38	1124.00 ± 36.46	NS
Final weight (g)	2448.00 [a] ± 83.65	2488.00 [a] ± 66.87	2188.57 [b] ± 83.04	2333.5 [ab] ± 61.27	2290.50 [ab] ± 70.23	2449.29 [a] ± 96.40	*
Total gain	1320.5 [a] ± 72.7	1370.5 [a] ± 62.34	1054.5 [b] ± 70.2	1186.5 [ab] ± 46.18	1111.0 [b] ± 67.21	1325.3 [a] ± 94.64	*
Experimental period (70 days)							

Daily gain	18.86 [a] ± 0.35	19.58 [a] ± 0.40	15.06 [b] ± 0.62	16.95 [ab] ± 0.50	15.87 [b] ± 0.33	18.93 [a] ± 0.45	*
Daily feed intake	84.49 [a] ± 0.52	80.50 [a] ± 0.54	73.99 [b] ± 0.62	86.20 [a] ± 0.57	79.42 [ab] ± 0.56	77.47 [ab] ± 0.25	*
Total feed conversion	4.48 [ab] ± 0.25	4.11 [b] ± 0.22	4.51 [ab] ± 0.32	5.08 [a] ± 0.17	5.00 [a] ± 0.26	4.16 [b] ± 0.10	*

[*a,b] Means in the same row with different superscripts differ significantly(p≤0.05). NS not significant.

Feed intake (FI):

Feed intake (FI) presented in (Table 4). Daily feed intake during the experimental period was slightly low with rabbit on groups D2 , D3,D5 and D5.This slightly decrease may be due to that fenugreek seeds up to 28% contained some compounds which led to sour test , so intake was decreased in D2 and D3 compared with clover hay containing D1. However, it showed that animal fed D4(14% SB +14% SF mixture) consumed higher feed intake than other groups including D1 group .This may be due to vegetation process which makes roughage more softness and more palatable(El-Ashery *et al.,* 2001 ; Abbase, 2009). Moreover, animals fed D2 , D3 and D5 received more TDN intake than D4, where they were higher in TDN% than D4 by 4.7 , 2.2 , and 4.4%, respectively (Table 5).

Table 5. Digestion coefficients, nutritive values and nitrogen balance of rabbit fed tested diets (Means ± SE)

Items	Tested Diets							
	D_1	D_2	D_3	D_4	D_5	D_6	SE±	Sig.
Digestibility%								
DM	71.20	74.68	71.04	69.79	74.66	72.41	2.82	NS
OM	63.03[b]	72.15[a]	69.69[ab]	67.37[ab]	72.32 [a]	70.67[ab]	3.32	*
CP	83.50[b]	85.62[ab]	85.15[ab]	85.32 [ab]	85.63 [ab]	87.31[a]	1.67	*
CF	42.25	50.50	47.10	40.32	51.62	48.71	7.21	NS
EE	81.82[ab]	78.53[b]	84.93[ab]	87.31 [a]	83.17[ab]	85.64[ab]	3.11	*
NFE	62.31[b]	73.85[a]	68.12[ab]	66.1[ab]	72.53[ab]	71.76[ab]	3.31	*
Nutritive value %								
TDN	63.88[b]	67.62[a]	65.96 [a]	64.57[ab]	67.43 [a]	69.34[a]	2.95	*
DCP	15.12[b]	15.53[ab]	15.39[ab]	15.65[ab]	15.64[a]	15.67[a]	0.27	*

Nitrogen balance (g/h/d)								
N I	3.15	2.99	3.00	3.42	2.81	3.42	0.3	NS
F N	0.50	0.43	0.38	0.51	0.36	0.50	0.08	NS
Urinary N	0.76^{ab}	0.59^{b}	0.99^{a}	0.68^{ab}	0.95^{a}	0.82^{ab}	0.23	*
NB	1.89^{ab}	1.97^{ab}	1.64^{b}	2.24^{a}	1.51^{b}	2.10^{a}	0.11	*
NB/NI	59.93^{ab}	65.74^{a}	54.60^{b}	65.23^{a}	53.26^{b}	61.44^{ab}	2.10	*

^{*a,b} **Means in the same row with different superscripts differ significantly($p \leq 0.05$). NS not significant.**

Feed conversion ratio(FCR):

Data in (Table 4) indicated that the best feed conversion (g feed/g gain) was observed with feeding rabbits D2 followed by D6 being 4.11 and 4.16, respectively, while the worst feed conversion was found for rabbits fed D4(5.08)followed by those fed D5 (5.00). This improvement of FCR for these diets may be due to the higher body weight gain and lower feed intake, beside their higher NB (Table 5). These results agreed with the finding of Fathia Ibrahim *et al.* (2001) ; Mahrous and Abo Ammou (2005).Also the result of Haiam, Abd El- Nabi (2007) indicated that feed conversion of lambs fed vegetated barley or fenugreek was better than those fed unvegetated barley grains.

Nutrient Digestibility,Nutritive values and Nitrogen balance:

Nutrient Digestibility:

Data in (Table 5) indicated that OM, CP and NFE digestibility value were higher than values of clover hay (control). This increase may be due to the improvement of chemical composition of vegetated diets (increasing OM,CP,NFE and decreasing the content of CF, (Table1). This result agree with that obtained by El-Ashery *et al.* (2001) as well as Haiam Abd El-Nabi (2007) reported that biological treatments of straw led to an increase of CP content and nutrient digestibility. Abo-Donia *et al.* (2005) mentioned that the improvement of nutrients digestibility with fenugreek and its mixture could be illustrated on basis that fenugreek contain saponins which stimulate anaerobic fermentation of OM that improve efficiency of utilization of nutrients. More over Abbase (2009) reported that vegetated barley is rich in *β –gluconase* enzymes which led to hydrolysis complex carbohydrates to simpler nutrients.

There was an increase in OM digestibility for D2,D3,D4,D5 and D6 by 14.5 , 10.9 , 6.9 14.7 and 12.2%, respectively compared with clover hay diet . This could be explained on the basis that vegetation process improved the digestibility and nutritive value of rice straw as bedding material(El-Ashery *et al.,* 2001 and Abbase , 2009. So that it gave the best result obtained from the experimental diets which included five groups of growing rabbit and

emphasize the ability of replacing clover hay by the sprouted materials as good quality roughage.

Similar finding by Koehler *et al.* (2007) who reported that, the improvement may be due to the enzyme activity of many bacteria and fungi which depend on association with plants that often regulated by root exudates . The present data supported by Fathia Ibrahim *et al.* (2001), who noticed an increase in the digestibility of DM ,OM , CP ,CF ,EE and NFE by 51.3 ,37.7 ,103.3 ,44.6 , 9.6 and 27.7%, respectively when sheep were fed ration contained sprouted barley-straw compared with those fed ration contained raw rice straw.

Nutritive value:

Table (5) showed that nutritive value data as TDN and DCP. There was a significant increase among D1 group and the range of other tested groups being (63.88%) vs. (64.57 to 69.30 %). Values of DCP showed that the same trend , The data also showed that all tested groups(from D2 to D6), which contained vegetated diets were higher than the control diet (D1). This increase may be due to the significantly improvement in digestion coefficient of most nutrients. It also could be due to the improvement of nutrients quality, because of the ability of sprouted germinated plants to transport nutrients to the roots to meet the requirement for strong healthy vegetative growth , beside increasing protein, vitamins and minerals content during vegetation process (Shipared, 2005 and Dung *et al.,* 2010).

Fathia Ibrahim *et al*. (2001) found that ,there was an increase in nutritive value as TDN and DCP by 34.1 and 166.8%,respectively for sprouted barley compared with raw straw. Moreover results of Haiam Abd El_Nabi (2007) found that using sprouted barley with sprouted fenugreek mixture in sheep ration led to improve TDN and DCP values, compared with ration contained unvegetated barley and fenugreek seeds.

Data of nitrogen balance (Table 5) showed that there was a significant ($P<0.05$) increase in NB with D4 and D6 compared with other diets . Highest values of nitrogen balance was found in D6 followed by D4(contained vegetated fenugreek and barley) . These results agreed with those obtained by Fathia Ibrahim *et al.* (2001) and Haiam Abd El-Nabi (2007). The biological value (BV) was calculated (NB/NI) present in (Table 5). It was in same trend as nitrogen balance.

Conclusion

From the results of the present study , it improved nutritive value, feed efficiency and growth performance by feeding rabbits on diets containing sprouts fenugreek seeds or/ and sprouts barley grains replacing with clover hay at level 28% without any bad effect on growth.

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الاستفادة من بعض النباتات المستنبتة بدون تربة فى تغذية الأرانب

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الملخص العربي

تهدف هذه الدراسة الي تقييم امكانية استخدام نبتة حبوب الشعير او بذور الحلبة علي قش الارز وإدخالها لمنتج في علائق الارانب النامية كبديل لدريس البرسيم. استخدم في هذه الدراسة عدد ٦٠ ذكر ارنب نيوزيلندي ابيض نامي في عمر ٧ اسابيع بمتوسط وزن (١١٣٨ ± ٣٢) جرام قسمت عشوائيا الي ٦ مجموعات وكل مجموعة الي ١٠ ارانب نامية في مكررين بكل خمسة . غذيت علي ٦ علائق تجريبية . عليقة الكنترول وعدد ٥ علائق اخري تحتوي علي نبتة الحلبة او الشعير النامي علي قش الارز ومخلوطهما بنسب (صفر ، ٧، ١٤، ٢١، ٢٨%) بالاحلال مع دريس البرسيم في عليقة الكنترول وذلك لمدة ١٠ اسابيع . لبحث تأثير هذه العلائق التجريبية علي كل من: النمو – كمية المأكول – الكفاءة الغذائية – معاملات الهضم والقيم الغذائية وميزان النيتروجين.

ويمكن تلخيص نتائج هذه الدراسة فيما يلى:

سجلت مجموعة الارانب المغذاة علي العليقة المحتوية علي (٢٨% نبتة حلبة اعلي معدل زيادة في الوزن يليها التي تغذت علي العليقة المحتوية على ٢٨%نبتة الشعير ثم عليقة

الكنترول بينما كانت اقل المجموعات زيادة في الوزن التي تغذت علي العليقة المحتوية علي مخلوط (٢١% نبتة حلبة +٧% نبتة شعير).وكانت كمية الغذاء المستهلك خلال فترة التجربة كانت اقل في المجموعة التي تغذت علي العليقة المحتوية علي مخلوط(٢١% نبتة حلبة +٧% نبتة شعير) يليها المجموعة التي تغذت علي العليقة المحتوية علي مخلوط(٢٨% نبتة حلبة) تليها المجموعة التي تغذت علي العليقة المحتوية (٧% نبتة حلبة +٢١% نبتة شعير) بينما اكثر المجموعات استهلاكا للغذاء كانت المجموعة التي غذيت علي العليقة المحتوية علي مخلوط (١٤%حلبة+١٤%شعير) مقارنةً بمجموعة الكنترول.كما اظهرت مجموعة الارانب التي تغذت علي العليقة المحتوية علي (٢٨% نبتة حلبة) اعلي كفاءة تحويل غذائى بينما كانت اقل المجاميع للتحويل الغذائي هي التي تغذت علي المخلوط (١٤% حلبة+١٤% شعير).كما اظهرت نتائج معاملات الهضم ارتفاع معاملات الهضم للمادة العضوية والبروتين الخام، المستخلص الخالي من النيتروجين في جميع المعاملات المحتوية علي نسبة كل من الحلبة والشعير او مخلوطهما مقارنة بدريس البرسيم بينما ارتفع معامل هضم الالياف ارتفاعا فى جميع المعاملات التجريبية مقارنة بدريس البرسيم وكان اعلاها في المعامله الثانية (٢٨% نبتة الحلبة) .بينما كانت القيمة الغذائية في العلائق التجريبية في صورة المركبات الغذائية المهضومة والبروتين المهضوم أعلي عن العليقة المقارنة .المحتجز النيتروجيني كان موجب في كل المجاميع المغذاة علي العلائق التجريبية وقد اظهرت المجاميع المغذاة علي العلائق المحتوية علي (٢٨%نبتات حلبة) ،(١٤% نبتات حلبة+١٤% نبتات شعير) ،(٢٨% نبتات شعير) اعلي محتجز نيتروجيني مقارنة بالكنترول والعلائق الاخري.

يستنتج من هذا البحث: أنة باستخدام كل من بذور الحلبة وحبوب الشعير كجزء من عليقه الأرانب أدى إلى رفع القيمة الغذائية و الكفاءة التحويلية دون حدوث أى أضرار على النمو.