# INFLUENCE OF USING REED FORAGE IN DIFFERENT FORMS AS FRESH, SILAGE AND HAY ON BLOOD PROFILE AND CARCASS QUALITY OF GROWING RAHMANI SHEEP

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## ABSTRACT

Aiming to complete evaluation of feeding on reed forage, this study concerned with measuring changes in carcass characteristics and blood profile due to feeding reed either fresh (RF), silage (RS) or hay (RH) to Rahmani growing lambs. Changes in most tested blood parameters were not significantly affected by type of feeds tested. But, hemoglobin (Hb), mean cell hemoglobin concentration (MCHC) and lymphocytes were significantly more with RS than RH. The same trend was noticed for total protein and globulin. The other blood parameters tested did not show preference for any of the tested diets. Carcass cuts show significant ($P < 0.05$) increase in shoulder and legs weight of groups fed RS or RF compared to RH and Berseem hay (BH). The prime cuts in general was heavier with RS followed by RF then estimates with RH and BH were significantly less. Weight of 9-11$^{th}$ ribs cut was increased with RS (530g) and RF (524g) than BH (479g) and RH (462g). Thus meat weight was significantly higher with both of RS and RF compared with BH and RH. The same trend was observed with fat weight. The animals fed RH ration had the lowest eye muscle area, while the largest area was recorded with RS where difference was significant between RH and RS only. Accordingly, reed in general has slight better but sure not less feeding values reflected on carcass and blood parameters when fed as silage compared to BH and other types of reed tested.

## INTRODUCTION

The shortage of animal feeds in Egypt especially in the draught summer season is considered one of the main problems in animal production. Most animal feeding in this period depends on concentrate feed mixture, which has high cost, and some agricultural residues. Green forage (or silage) represent a cheap food for ruminants either for meat or milk production (Soliman *et al.,* 1997 and Ahmed *et al.,* 2009a).

Some studies (Gabr *et al.,* 1999 and Shehata *et al.,* 2006) indicated that reed forage (or silage) had a good palatability and adequate feeding value for dairy Zaraibi goats and could nutritionally and economically replace high quality summer forage like sorghum (or maize silage), resulting in reducing the feed cost. In a recent studies (Ahmed *et al.,* 2009b and 2011) concluded that reed forage silage recorded the highest digestibility, feeding value and growth performance with Rahmani lambs and the highest milk production with good economic return with lactating Zaraibi goat without any adverse effect on milk quality. Literature on the effect of using reed forage either fresh, silage or hay in lambs rations on carcass quality is scarce. Therefore, the main objective of the present work was to recognize the effect of substitution of berseem hay with reed forage in different forms, fresh, silage or hay on carcass quality and blood profile of Rahmani lambs.

## MATERIALS AND METHODS

The animals, materials and dietary treatments used herein were the same as in the first part (Ahmed *et al.*, 2009b) of this scientific papers, where:

G1: 50% concentrate feed mixture (CFM) + 50% berseem hay (BH) – wheat straw (WS), (control, BH).

G2: 50% CFM + 50% reed hay (RH).

G3: 50% CFM + 50% reed silage (RS).

G4: 50% CFM + 50% reed fresh (RF).

Lamb's groups were fed according to NRC allowances (1985). CFM formed 50% of all lambs ration, while the other 50% were; barseem hay (BH) mixed with wheat straw (WS) at rate of 3:1 for the control group; reed hay (RH) in group-2, reed silage in group-3 (RS) and reed fresh (RF) in the group-4. The chemical composition of the tested ingredients are presented in Table 1 (as reported in the first part of this research by Ahmed *et al.*, 2009b).

Table 1: The chemical composition of the tested ingredients.

| Item | Feed ingredients | | | | | |
|---|---|---|---|---|---|---|
| | CFM | BH | WS | RH | RS | RF |
| **Chemical composition, % (on DM basis)** | | | | | | |
| **DM** | 90.50 | 89.40 | 90.80 | 91.80 | 30.10 | 29.70 |
| **OM** | 93.2 | 87.5 | 83.00 | 89.50 | 89.60 | 90.00 |
| **CF** | 14.80 | 28.40 | 37.50 | 29.70 | 28.90 | 29.50 |
| **CP** | 15.10 | 13.90 | 3.40 | 10.60 | 10.90 | 10.70 |
| **EE** | 3.50 | 2.30 | 1.70 | 3.00 | 3.10 | 3.00 |
| **NFE** | 59.80 | 42.90 | 40.40 | 46.20 | 46.70 | 46.80 |
| **Ash** | 6.80 | 12.50 | 17.00 | 10.50 | 10.40 | 10.00 |
| **NDF** | 45.90 | 59.50 | 73.50 | 68.50 | 65.70 | 67.00 |
| **ADF** | 15.30 | 37.00 | 51.30 | 40.70 | 38.30 | 39.60 |
| **ADL** | 5.70 | 6.80 | 9.30 | 8.06 | 7.90 | 7.90 |
| **Macro elements, %** | | | | | | |
| **Ca** | 0.85 | 1.70 | 0.21 | 1.15 | 1.21 | 1.13 |
| **P** | 0.97 | 0.35 | 0.05 | 0.27 | 0.34 | 0.30 |
| **Mg** | 0.43 | 0.29 | 0.11 | 0.33 | 0.37 | 0.36 |
| **Na** | 0.55 | 0.15 | 0.13 | 0.10 | 0.09 | 0.11 |
| **K** | 0.65 | 2.13 | 1.26 | 2.53 | 2.45 | 2.38 |
| **Micro elements, PPm** | | | | | | |
| **Zn** | 23 | 31 | 11 | 37.5 | 39.5 | 38.0 |
| **Fe** | 57 | 153 | 113 | 126 | 131 | 123 |
| **Mn** | 73 | 45 | 27 | 31 | 33.5 | 28.5 |
| **Cu** | 4 | 5 | 3 | 2 | 3 | 2 |

CFM: concentrate feed mixture BH: Berseem hay;
WS: Wheat straw RH: Reed hay
RS: Reed silage RF: Reed forage

At the end of growth experiment the animals fed the same rations for 2 weeks before slaughtering of lambs. Blood samples were collected from 3 lambs before slaughtering . The whole blood was immediately directed to hematological studies. Another blood samples were centrifuged at 4000 rpm for 20 minutes. Part of the separated serum was directed to enzymes determination and another part was stored frozen at -20°c till the biochemical analysis. Commercial kits were used for colorimetric determination according to the following references:

| Criteria | References | |
|---|---|---|
| Hemoglobin (Hb) | Linné and Ringsrud | (1992) |
| Hematocrit (Hct) | Linné and Ringsrud | (1992) |
| Read blood cells (RBC's) | Miller and Weller | (1971) |
| Mean cell volume (MCV) | Schalm *et al.* | (1975) |
| Mean cell hemoglobin (MCH) | Schalm *et al.* | (1975) |
| Mean cell hemoglobin concentration | Schalm *et al.* | (1975) |
| White blood cells (WBC's) | Coles | (1986) |
| Differential leukocyte count | Linné and Ringsrud | (1992) |
| Platelet count | Linné and Ringsrud | (1992) |
| Glucose | Teuscher and Richterich | (1971) |
| Total protein | Doumas *et al.* | (1981) |
| Albumin | Hill and Wells | (1983) |
| Globulin | Coles | (1986) |
| Urea-N | Freidman *et al.* | (1980) |
| Creatinine | Ullmann | (1976) |
| Total lipids | Schmit | (1964) |
| Cholesterol | Schettler and Nüssel | (1975) |
| Bilirbin | Monnet | (1963) |
| Calcium, (Ca) | Elveback | (1970) |
| Inorganic phosphorus, (P) | Freidman *et al.* | (1980) |
| Magnesium, (Mg) | Oranye and Rhein | (1951) |
| Sodium, (Na) | Maruna | (1958) |
| Potassium, (K) | Henry | (1974) |
| Aspartic aminotransfers, (AST) | Reitman and Frankel | (1957) |
| Alanine aminotransfers, (ALT) | Reitman and Frankel | (1957) |
| Alkaline phosphatase, (ALP) | Belfield and Goldberg | (1971) |

Lambs kept starved of feed and water 16 hr. then weighed, sacrificed, completely bled, skinned then dressed out and the hot carcass was weighed to determine the dressing percentage. Different offal and organs were weighed as well as carcass cuts. Hot carcass depended on lift side of the carcass was weighed. The 9-11$^{th}$ ribs (*longissimus dorsi*) were chilled, then separated to lean, bone and fat to estimate the physical and chemical composition beside measuring weight, area and thickness of fat. Samples of feed and meat were analyzed according to A.O.A.C. procedures (1995) Data were statistically analyzed using SAS (2003). The significant differences between means were assigned according to Duncan (1955).

## RESULTS AND CONCLUSION

### 1-Blood profile

### 1-1-Hematological parameters:

Concerning hematological parameters, the results indicated that most tested blood parameters were not significantly affected by the tested types of experimental rations (Table2). However, as a trend RS caused higher hemoglobin (12.07), MCHC% (36.07%) and lymphocytes (64.33%) compared to other tested feeds. Similar results were observed by Shehata *et al.,* (2006) with goats fed reed as silage or hay compared with berseem hay. These results may indicate the beneficial effect of feeding RS on lamb's metabolism. Similar results were observed by Shehata *et al.,* (2006) and Ahmed *et al.,* (2009b). They reported that both of Hb and RBC's were higher with RS compared with the other such as RH and this may be attributed to the higher Fe and Cu in the reed which may be

more available for lambs in either silage or fresh forms than hay.

**1-2- Biochemical parameters:**

Table (3) shows that most biochemical parameters were not significantly different among the treatments. Whereas, RH had significantly lower TP and globulin than other tested rations. In general, RS had the highest concentrations of most parameters, followed by RF then BH. . Similar results were observed by Gabr *et al.,* (1999) with goats fed reed forage and/or sorghum plants and Shehata *et al.,* (2006) when used reed forage (silage or hay) or berseem hay with dairy goats. Minerals concentrations were in general not differed significantly among the tested rations. P was significantly higher with RS and RF than other two rations. Shehata *et al.,* (2006) observed that serum phosphorus (inorganic) was higher with silage (reed or maize) compared with hay (reed or berseem). Kaneko (1989) cited that the normal physiological range of blood phosphorus (inorganic) is from 5.0 to 7.3 mg/dl.

The enzymes activity (AST, ALT and ALP) showed some fluctuation among groups but without significance. The same trend was observed by Shehata *et al.,* (2003 and 2006). Generally, the results indicated that measured blood parameters showed slight differences among tested diets where all values were within the normal physiological ranges reported by Jain (1986) and Kaneko (1989) for healthy goats. This indicate that, to a reasonable level, reed forage (in different forms) have no hazardous or anti-nutritional effect when fed to animal.

**2- Carcass characteristics:**

**2-1- Dressing percentage:**

The data of hot carcass weight and dressing percentage of growing Rahmani lambs fed tested rations containing different reed forms (fresh, silage or hay) and berseem hay are presented in Table (4).

The results show that feeding RS had significant better performance than RH and BH in fasting and empty BW., which was reflected also on significant improvement in dressing values and hot carcass weights. RF came next to RS and had better performance than BH but differences were insignificant between RH and BH either for fasting or empty BW or hot carcass and dressing values. RH was the least in all carcass parameters, however the decreases than BH were not significant.

The same trend was observed with prime cuts as shown in Table (4). The highest prime cuts was observed with RS (16.0 kg or 65.80%) followed by RF (15.0 kg or 64.58%) then BH (13.8 kg or 64.09%) and finally RH (13.25 kg or 63.52%). The improvement in carcass characteristics with using reed silage in lambs rations is compatible with the changes in body weight and growth rate in response to present feed sources (Ahmed *et al.,* (2009b). The obtained values in the present study were approximately similar with those obtained by Abdelhamid *et al.,* (2004) with growing Rahmani sheep. Similarly, the values dressing percentage (relative to fasting weight, A) were ranged from 50.2 to 52.7% whereas dressing (relative to empty weight, B) were ranged from 56.4 to 59.5% in slaughtered Rahmani sheep (Abou Ammou and El-Hosseiny, 1999).

Stomach fat ranged from 0.27 to 0.33 kg and total internal fat% from 1.97 to 2.53 % where RS had the least estimates while the highest values were not specific to one of the other treatments, especially when significance considered.

**2-2- Carcass cuts:**

The data of carcass cuts (leg, loin, neck, rack, brisket, flank and tail) are presented in Table (5). It is interest that major cuts, shoulder and legs, showed significant increase with RS or RF than RH or BH. RS had the heaviest cut weights followed by RF without significance in difference. RH had the least cuts weights followed by BH without significance differences between them. All other cuts did not show significance differences though RS had in general the heaviest cut weights while RH the least weights.. The same trend was observed with Gabr *et al.,* (2003) and Abdelhamed *et al.,* (2004) with most carcass cuts as % of hot carcass weight.

**2-3- Offal and organs:**

The effect of feeding status on weights of carcass offals and organs are presented in Table (6). As fasting weight significantly differed among tested diets, the offals and organs weights as percentage of fasting weights was consider for comparisons. The obtained percentages (Table 7) revealed that all offals (heart, kidney, lungs and spleen) and organs (head, pelt and legs) were not significantly differed due to experimental rations. The same effect was observed also with full and empty digestive tract.

The values of different offals and organs in the present study were nearly similar to those obtained by Gabr *et al.,* (2003) with growing Rahmani lambs who found that values of total offals as % of fasting weight ranged from 3.73 to 4.04 %. In this respect, Ahmed (2003) observed that most weights (or % from fasting weight) of offals and organs were not significantly affected with increasing berseem hay in the growing kids ration.

**2-4- Carcass quality and chemical analysis:**

Data of carcass quality and chemical analysis of the *longismus dorsi* are shown in Table (8). The RH group had the lowest weight of the 9-11$^{th}$ ribs cut, while the highest was recorded in the group received reed silage (RS). The differences in weight of 9-11$^{th}$ ribs cut between either treatments BH and RH on one side and RS on the other side were significant. Also, there were significant differences in meat, fat and bone weights and L.D. area as shown in Table (8). Similarly, the highest values of meat : fat and meat : bone ratios were recorded with RS (2.19 and 2.48, respectively) then RF (2.18 and 2.42, respectively) followed by BH (2.11 and 2.40, respectively) while RH group recorded the lowest values (2.08 and 2.39, respectively). Values of meat to fat and meat to bone in the present study were noticeably lower than those reported by Ahmed (2003) and Allam *et al.,* (2007) for Zaribi kids and Farafra lambs, respectively while it recorded approximately similar values with Rahmani lambs (Abdelhamid *et al.,* 2004). They found that values of meat : fat ratio ranged from 2.20 to 2.28 *vs.* 2.52 to 2.62 for meat : bone. Chemical composition of L.D.%, show that the highest and lowest percentage of CP and EE, respectively were in RS and the differences in CP% were significant. The values of chemical composition in the present study were approximately similar with Gabr *et al.,* (2003) and Abdelhamid *et al.,* (2004).

## CONCLUSION

It could be concluded that feeding reed as silage could improve dressing percentage, carcass weight and most meat quality parameters compare to feeding reed either fresh or as hay.

Meanwhile, RS is compatible to Berseem hay in most carcass characteristics and blood profile. So, economic wise RS is a good summer alternative to Berseem hay.

## REFERENCES

A. O. A. C. (1995). Official Methods of Analysis. (16th) Edt. Association Analytical Chemists, Washington, D.C., USA.

Abdelhamid, A..M., F. F. Abou Ammou, A.E. Abdel-Khalek, M.E. Ahmed, E.I. Shehata, and G.A. Maged (2004). Effect of dietary supplementation with chamomile flowers on carcass characteristics and histology of some organs in Rahmani sheep. J. Agric. Sci. Mansoura Univ., 29 : 6119.

Abou Ammou, F.F. and H.M. El-Hosseiny (1999). Performance and carcass characteristics of lambs fed Biotonic and Bosporo as feed additives, in summer and winter seasons. Egyptian J. Nutrition and Feeds, 2: 57.

Ahmed M.E.; A.A. Abd El-Hamid; Fathia A. Ibrahim and E.S. Soliman (2009a). Nutritional and economical studies of growing lambs and lactating goats fed different legume-grass mixtures. Egyptian J. Nutrition and Feeds, 12 (3): 263.

Ahmed, M.E. (2003). The economic marketing weight of male Zaraibi goats. Egyptian J. Nutrition and Feeds. 6 1311.

Ahmed, M.E., E.I. Shehata, Faten. F. Abou Ammou, E.I. Khalifa and O.A. El-Zalaky (2009b). Productive and reproductive performance of Rahmani sheep fed rations contaning reed forage (Arundo domex, L.) either fresh, hay or silage. Egyptian J. of Sheep, Goats Sci. 4(1) :45.

Ahmed, M.E., O.A. El-Zalaky, K.M. Aiad and E.I. Shehata (2011). Response of small ruminants to diets contaning reed forage either as fresh, silage or hay versus berseem hay. Egyptian J. of Sheep & Goats Sci. 6(1) :15.

Allam, S.M., Faten F. Aboo-Ammou, A.M. Ali and Shaimaa R. Abd-Elgaber (2007). Effect of Zinc suplementation on the performance and carcass characterstics of Growing lambs fed rations differ in crude protein content. J. Agric. Sci. Mansoura Univ., 32 (5) : 3393.

Belfield, A. and D. M. Goldberg (1971). Enzyme, 12: 561.

Coles, E. H. (1986). Vet. Clin. Path., 4th ed., W. B. Saunders Company.

Doumas, B. T.; D. D. Carter; R. J. Peters and T. R. Schaffer (1981). A candidate reference method for determination of total protein in serum. Development and Validation. Clin. Chem., 27: 1642.

Duncan, D. (1955). Multiple ranges and multiple F-test. Biometrics, 11: 1.

Elveback, L. R. (1970). J. Am. Med. Ass. 211:69.

Freidman, R. B.; R. E. Anderson; S. M. Entire and S. B. Hinshberg (1980). Clin. Chem. 26.

Gabr, A. A., E. I. Shehata, M. E. Ahmed and M. H. Azzam (2003). Performance and carcass trails of Rahmani lambs fed rations containing dried poultry manure with addition of bentonite clay. Egyptian J. Nutrition and feeds. 6 (2): 173.

Gabr, A. A.; A. Z. Mehrez; E. S. M. Soliman and M. E. El-Kholany (1999). Response of lactating goats to diets containing reed grass (Arundo domex, L.) versus sorghum plants, Egyptian J. Nutrition and feeds 2 (special Issue), 297.

Henry, R.J. (1974). Clin. Chem. Harper&Row, New York, Sec. Edit, pp: 644.

Hill, P. G. and T. N. Wells (1983). Ann. Clin Biochem., 20: 265.

Jain, N.C. (1986). Veterinary Hematology. 4thed., Lea & Febiger. Pheladelphia.

Kaneko, J. J. (1989). Clinical Biochemistry of Animals. 4thEd., Academic Press, Inc. USA

Linné, J. J. and K. M. Ringsrud (1992). Basic Techniques in Clinical Laboratory Science. 3rd ed. Mosby Year Book.

Maruna, R. (1958). Clin. Chem. Acta, 2: 581.

Miller, S. E. and J. M. Weller (1971). Textbook of Clinical Pathology. 8th ed., The Williams and Wilkins Co., Baltimore. Scientific Book Agency. Calcutta.

Monnet, L. (1963). Determination of bilirubin. Annal Bio. Clin., 21: 717.

N.R.C. National Research Council (1985). Nutrient requirements of domestic animals. Nutrient requirements of sheep. National Research Council, Washington.

Oranye, M. and M. Rhein (1951). Micro-estimation of magnesium in body fluids. J. Biol. Chem. 189: 379.

Reitman, A. and S. Frankel (1957). A colourimetric method of determination of s.GOT and s.GPT. American J. of Clinical Pathology, 28: 56.

SAS Institute (2003). SAS/STATR User's Guide: statistics. Ver. 9.1, SAS Institute Inc., Cary, NC, USA.

Schalm, O. W.; N. C. Jain and E. J. Carroll (1975). Veterinary Hematology, 3rd ed. Lea and Febiger. Philadelphia.

Schettler, G. and E. Nüssel (1975). Arbeitsmedizin, Präventivmedizin, 10: 25-29.

Schmit, J. M. (1964). Thesis, Lyon.

Shehata, E. I., M.E. Ahmed, Faten. F. Abou Ammou, A. A. M. Soliman and M. El-H. Haggag (2003). Effect of partial replacement of maize (zea maysl) with reed (Arundo domex, L.) in silage fed to growing Rahmani lambs. Egyptian J. Nutrition and feeds, 6: 969.

Shehata, E.I; M.E. Ahmed; Faten F.Abou Ammou; A.A.M. Soliman; K.M. Aiad and A.M. Abdel-Gawad (2006). Comparison of feeding reed as hay or silage with feeding berseem hay or maize silage to dairy Zaraibi goat. Egyptian J. of Sheep, Goats and Desert Animal Sci. 1(1) :233.

Soliman, E.S., A.E.M. Khinizy, Bahira K. Mohammed and M.El-H. Haggag (1997). Studies on using Sesbania and Teosinte forages in feeding of growing Zaraibi goats. Egypt. J. Appl. Sci., 12 (5): 36.

Teuscher, A. and R. Richterich (1971). Schweiz. Med. Woschr. 101: 345.

Ullmann, K. (1976). Bonitz. Med. Labor., 29:137.

**Table (2): Hematological parameters of growing Rahmani sheep as affected by different experimental rations.**

| Items | Groups | | | |
|---|---|---|---|---|
| | BH | RH | RS | RF |
| Hemoglobin (Hb), g/dl | 11.53±0.20 $^{ab}$ | 11.33±0.20$^{b}$ | 12.07±0.20$^{a}$ | 11.77±0.20$^{ab}$ |
| Hematocrite (Hct), % | 34.67±0.88 | 35.50±1.04 | 33.50±1.04 | 33.67±0.88 |
| Read blood cells (RBC's),×$10^{6}$/ul | 13.23±0.26 | 13.03±0.26 | 13.93±0.32 | 13.47±0.32 |
| Mean cell hemoglobin concentration (MCHC%), % | 33.30±0.31$^{b}$ | 31.90±0.45$^{c}$ | 36.07±0.58$^{a}$ | 34.90±0.31$^{a}$ |
| Mean cell hemoglobin volume (MCV), fl | 32.33±0.88 | 31.33±1.86 | 28.33±2.73 | 31.00±1.53 |
| Mean cell hemoglobin (MCH), Pg | 12.33±0.60 | 12.50±0.76 | 13.33±0.60 | 13.00±0.58 |
| White blood cells (WBC's),×$10^{3}$/ul | 9.67±0.09 | 9.80±0.10 | 9.73±0.23 | 9.63±0.26 |
| Nutrophils, % | 30.00±1.80 | 32.50±1.32 | 28.83±1.92 | 29.50±2.18 |
| Lymphocytes, % | 60.83±0.73$^{bc}$ | 59.00±0.76$^{c}$ | 64.33±1.01$^{a}$ | 62.67±1.30$^{ab}$ |
| Monocytes, % | 5.50±0.58 | 5.33±0.44 | 4.60±0.38 | 4.83±0.44 |
| Eosinophils, % | 2.67±0.17 | 2.50±0.29 | 2.33±0.60 | 2.17±0.44 |
| Stap cell, % | 0.67±0.17 | 0.37±0.13 | 0.50±0.23 | 0.43±0.07 |
| Platelets (PLT),×103/ul | 618±21.67 | 611±19.09 | 654±14.50 | 639±16.60 |

**Table (3): Biochemical parameters of growing Rahmani sheep as affected by different experimental rations.**

| Items | Groups | | | |
|---|---|---|---|---|
| | BH | RH | RS | RF |
| Glucose, mg/dl | 69.00±2.31 | 67.00±2.08 | 71.00±1.15 | 69.67±1.45 |
| Total protein, g/dl | 6.90±0.06$^{a}$ | 6.57±0.12$^{b}$ | 7.10±0.15$^{a}$ | 7.03±0.12$^{a}$ |
| Albumin (A), g/dl | 2.93±0.09 | 2.90±0.06 | 2.93±0.07 | 3.00±0.12 |
| Globulin (G), g/dl | 3.97±0.03$^{a}$ | 3.67±0.07$^{b}$ | 4.17±0.09$^{a}$ | 4.03±0.03$^{a}$ |
| A/G | 0.74±0.03$^{ab}$ | 0.79±0.01$^{a}$ | 0.70±0.01$^{b}$ | 0.74±0.03$^{ab}$ |
| Urea-N, mg/dl | 12.67±0.17 | 12.50±0.68 | 13.03±0.32 | 13.10±0.35 |
| Creatinine, mg/dl | 0.87±0.06 | 0.93±0.04 | 0.85±0.03 | 0.95±0.03 |
| Total Lipeds, mg/dl | 403±23.07 | 408±17.64 | 418±17.40 | 423±23.33 |
| Cholesterol, mg/ dl | 65.00±2.65 | 67.00±2.31 | 70.00±3.21 | 71.00±3.06 |
| Total bilirubin, mg/dl | 0.29±0.02 | 0.27±0.03 | 0.31±0.02 | 0.32±0.02 |
| Calcium, mg/ dl | 10.90±0.31 | 11.00±0.25 | 11.47±0.09 | 11.23±0.09 |
| Phosphorus, mg/ dl | 6.47±0.12$^{c}$ | 6.60±0.15$^{bc}$ | 7.07±0.09$^{a}$ | 6.93±0.09$^{ab}$ |
| Magnesium, mg/dl | 3.20±0.03 | 3.17±0.15 | 3.23±0.07 | 3.30±0.15 |
| Sodium, mEq/L | 157±3.84 | 146±4.51 | 149±2.91 | 151±4.18 |
| Potassium, mEq/L | 5.00±0.17 | 5.20±0.25 | 5.17±0.09 | 5.33±0.15 |
| Aspartate transaminase AST, IU/L | 73.00±2.65 | 75.33±2.67 | 69.00±4.36 | 71.67±4.37 |
| Alanine transaminase ALT, IU/L | 17.37±0.62 | 18.00±0.21 | 16.27±0.50 | 17.13±0.52 |
| Alkaline phosphatase ALP, IU/L | 143±4.16 | 149±4.93 | 138±3.71 | 146±3.53 |

a-c Means in the some row with different superscripts differ significantly at ($P < 0.05$).

**Table (4): Carcass characteristics of slaughtered Rahmani lambs fed the experimental rations.**

| Items | Groups | | | |
|---|---|---|---|---|
| | BH | RH | RS | RF |
| Fasting body weight, kg | 46.50±0.76$^{bc}$ | 45.00±1.00$^{c}$ | 50.00±0.76$^{a}$ | 48.50±0.76$^{ab}$ |
| Empty body weight, kg | 41.30±0.44$^{bc}$ | 39.77±0.91$^{c}$ | 44.00±0.76$^{a}$ | 43.00±0.76$^{ab}$ |
| Hot Carcass weight, kg* | 21.50±0.58$^{bc}$ | 20.50±0.79$^{c}$ | 24.30±0.38$^{a}$ | 23.20±0.64$^{ab}$ |
| Hot Carcass weight, kg** | 23.29±0.71$^{bc}$ | 22.20±0.89$^{c}$ | 26.23±0.49$^{a}$ | 25.07±0.77$^{ab}$ |
| Dressing percentage, % (A) | 46.22±0.58$^{bc}$ | 45.53±0.88$^{c}$ | 48.60±0.34$^{a}$ | 47.82±0.60$^{ab}$ |
| Dressing percentage, % (B) | 52.04±0.85$^{bc}$ | 51.51±0.85$^{c}$ | 55.23±0.21$^{a}$ | 53.94±0.58$^{ab}$ |
| Dressing percentage, % (C) | 50.06±0.79$^{ab}$ | 49.30±1.01$^{b}$ | 52.46±0.40$^{a}$ | 51.67±0.80$^{ab}$ |
| Dressing percentage, % (D) | 54.29±1.17$^{c}$ | 55.78±1.00$^{bc}$ | 59.62±0.27$^{a}$ | 58.28±0.79$^{ab}$ |
| Prime Cuts, kg | 13.80±0.76$^{ab}$ | 13.25±0.80$^{b}$ | 16.00±0.61$^{a}$ | 15.00±0.72$^{ab}$ |
| Prime Cuts,% | 64.09±1.86 | 64.52±1.49 | 65.80±1.53 | 64.58±1.38 |
| Kidney Fat, kg | 0.19±0.01 | 0.20±0.02 | 0.21±0.01 | 0.18±0.02 |
| Stomach Fat, kg | 0.30±0.02$^{ab}$ | 0.32±0.01$^{ab}$ | 0.27±0.02$^{b}$ | 0.33±0.01$^{a}$ |
| Total internal fat, kg | 0.49±0.03 | 0.52±0.03 | 0.48±0.03 | 0.51±0.02 |
| Total internal fat, % | 2.28±0.14$^{ab}$ | 2.53±0.04$^{a}$ | 1.97±0.09$^{c}$ | 2.20±0.04$^{bc}$ |

* Without edible organs ** With edible organs

(A): (Hot Carcass weight/ Fasting body weight) ×100

(B): (Hot Carcass weight/ Empty body weight) ×100

(C): (Hot Carcass weight with edible organs/ Fasting body weight) ×100

(D): (Hot Carcass weight without edible organs/ Empty body weight) ×100

a-c Means in the some row with different superscripts differ significantly at (P < 0.05).

**Table (5): Carcass cuts of slaughtered Rahmani lambs fed the experimental rations.**

| Items | Groups | | | |
|---|---|---|---|---|
| | BH | RH | RS | RF |
| **Carcass cuts weight, kg** | | | | |
| Shoulder | 3.40±0.10$^{b}$ | 3.20±0.21$^{b}$ | 4.00±0.21$^{a}$ | 3.70±0.15$^{ab}$ |
| Legs | 5.10±0.26$^{b}$ | 4.90±0.21$^{b}$ | 6.00±0.12$^{a}$ | 5.60±0.26$^{a}$ |
| Loin | 1.30±0.15 | 1.25±0.03 | 1.50±0.10 | 1.40±0.15 |
| Rack | 4.00±0.26 | 3.90±0.36 | 4.50±0.21 | 4.30±0.15 |
| Neck | 1.65±0.10 | 1.70±0.15 | 1.80±0.06 | 1.81±0.10 |
| Brisket | 0.71±0.02 | 0.69±0.04 | 0.80±0.03 | 0.75±0.04 |
| Flank | 1.10±0.12 | 1.05±0.04 | 1.25±0.10 | 1.20±0.06 |
| Tail | 3.30±0.15 | 3.20±0.08 | 3.50±0.13 | 3.40±0.16 |
| Prime Cuts, kg | 13.80±0.76$^{ab}$ | 13.25±0.80$^{b}$ | 16.00±0.61$^{a}$ | 15.00±0.72$^{ab}$ |
| **Carcass cuts as % from Hot Carcass weight** | | | | |
| Shoulder | 15.82±0.24 | 15.58±0.43 | 16.44±0.63 | 15.94±0.24 |
| Legs | 23.69±0.63 | 23.90±0.11 | 24.69±0.11 | 24.11±0.48 |
| Loin | 6.02±0.57 | 6.11±0.11 | 6.16±0.32 | 6.01±0.51 |
| Rack | 18.57±0.76 | 18.94±1.06 | 18.50±0.60 | 18.53±0.18 |
| Neck | 7.66±0.29 | 8.26±0.45 | 7.40±0.12 | 7.79±0.20 |
| Brisket | 3.30±0.02 | 3.36±0.06 | 3.29±0.09 | 3.23±0.07 |
| Flank | 5.09±0.40 | 5.12±0.11 | 5.13±0.36 | 5.17±0.11 |
| Tail | 15.33±0.36$^{ab}$ | 15.63±0.24$^{a}$ | 14.39±0.34$^{b}$ | 14.64±0.29$^{ab}$ |
| Prime Cuts,% | 64.09±1.86 | 64.52±1.49 | 65.80±1.53 | 64.58±1.38 |

a-b Means in the some row with different superscripts differ significantly at (P < 0.05).

**Table (6): Average weight of different carcass offals and organs of Rahmani lambs fed the experimental rations.**

| Items | Groups | | | |
|---|---|---|---|---|
| | BH | RH | RS | RF |
| Fasting body weight, kg | 46.50±0.76$^{bc}$ | 45.00±1.00$^{c}$ | 50.00±0.76$^{a}$ | 48.50±0.76$^{ab}$ |
| Hot Carcass weight, kg* | 21.50±0.58$^{bc}$ | 20.50±0.79$^{c}$ | 24.30±0.38$^{a}$ | 23.20±0.64$^{ab}$ |
| Head, kg | 2.90±0.13 | 2.70±0.13 | 3.20±0.28 | 3.10±0.18 |
| Pelt, kg | 6.00±0.28 | 5.80±0.38 | 6.30±0.22 | 6.15±0.25 |
| Leg, kg | 1.10±0.03 | 1.00±0.10 | 1.25±0.12 | 1.20±0.10 |
| Full dig Tract, kg | 8.40±0.43 | 7.90±0.58 | 9.30±0.38 | 9.00±0.65 |
| Empty dig Tract, kg | 3.20±0.28 | 3.10±0.22 | 4.00±0.46 | 3.70±0.53 |
| Heart, kg | 0.19±0.02 | 0.18±0.01 | 0.22±0.02 | 0.21±0.03 |
| Liver, kg | 0.62±0.01$^{b}$ | 0.59±0.01$^{b}$ | 0.65±0.01$^{a}$ | 0.64±0.02$^{a}$ |
| Kidney, kg | 0.12±0.01 | 0.12±0.02 | 0.13±0.02 | 0.13±0.02 |
| Lung, kg | 0.57±0.07 | 0.55±0.04 | 0.61±0.04 | 0.59±0.04 |
| Spleen, kg | 0.08±0.01 | 0.07±0.01 | 0.08±0.01 | 0.07±0.01 |
| Tests, kg | 0.21±0.01$^{ab}$ | 0.19±0.02$^{b}$ | 0.24±0.01$^{a}$ | 0.22±0.01$^{ab}$ |
| Total offal, kg | 1.79±0.13 | 1.70±0.10 | 1.93±0.11 | 1.87±0.13 |

**Table (7): Effect of the experimental rations on offals of Rahmani lambs as a percentage of fasting weight.**

| Items | Groups | | | |
|---|---|---|---|---|
| | BH | RH | RS | RF |
| Fasting body weight, kg | 46.50±0.76$^{bc}$ | 45.00±1.00$^{c}$ | 50.00±0.76$^{a}$ | 48.50±0.76$^{ab}$ |
| Head, % | 6.23±0.18 | 5.99±0.15 | 6.39±0.46 | 6.38±0.27 |
| Pelt, % | 12.89±0.39 | 12.86±0.58 | 12.59±0.27 | 12.67±0.33 |
| Leg, % | 2.37±0.04 | 2.21±0.19 | 2.51±0.27 | 2.48±0.16 |
| Full dig Tract, % | 18.05±0.68 | 17.52±0.92 | 18.59±0.54 | 18.52±1.06 |
| Empty dig Tract, % | 6.90±0.71 | 6.88±0.35 | 7.98±0.83 | 7.60±1.00 |
| Heart, % | 0.41±0.03 | 0.40±0.02 | 0.44±0.04 | 0.43±0.05 |
| Liver, % | 1.34±0.01 | 1.31±0.03 | 1.31±0.03 | 1.32±0.03 |
| Kidney, % | 0.26±0.01 | 0.27±0.03 | 0.26±0.04 | 0.27±0.04 |
| Lung, % | 1.22±0.13 | 1.22±0.06 | 1.23±0.05 | 1.22±0.06 |
| Spleen, % | 0.17±0.01 | 0.16±0.01 | 0.16±0.02 | 0.15±0.02 |
| Tests, % | 0.44±0.02 | 0.42±0.03 | 0.48±0.02 | 0.46±0.02 |
| Total offals, % | 3.84±0.22 | 3.77±0.14 | 3.86±0.16 | 3.85±0.21 |

**Table (8): Effect of the experimental rations on carcass traits and chemical composition of longissimus dorsi muscle.**

| Items | Groups | | | |
|---|---|---|---|---|
| | BH | RH | RS | RF |
| Weight of 9-11 ribs cut, g | 479±15.88$^{bc}$ | 462±9.84$^{c}$ | 530±14.88$^{a}$ | 524±14.19$^{ab}$ |
| Meat weight, g | 254±5.93$^{b}$ | 243±3.76$^{b}$ | 284±3.53$^{a}$ | 279±3.48$^{a}$ |
| Meat weight, % | 52.96±0.62 | 52.64±0.31 | 53.73±0.93 | 53.38±0.79 |
| Fat weight, g | 120±1.25$^{ab}$ | 117±3.46$^{b}$ | 130±2.89$^{a}$ | 128±5.21$^{ab}$ |
| Fat weight, % | 25.05±0.43 | 25.30±0.22 | 24.56±0.38 | 24.49±0.33 |
| Bone weight, g | 106±3.18$^{ab}$ | 102±2.65$^{b}$ | 115±3.79$^{ab}$ | 116±5.51$^{a}$ |
| Bone weight, % | 22.05±0.08 | 22.06±0.12 | 21.71±0.11 | 22.13±0.46 |
| Meat: Fat ratio of ribs | 2.11±0.05 | 2.08±0.03 | 2.19±0.05 | 2.18±0.06 |
| Meat: Bone ratio of ribs | 2.40±0.02 | 2.39±0.03 | 2.48±0.05 | 2.42±0.09 |
| L.D. area, $cm^2$ | 24.33±1.76$^{ab}$ | 23.00±0.58$^{b}$ | 27.00±0.58$^{a}$ | 26.00±0.29$^{ab}$ |
| **Chemical composition of L.D. (%)** | | | | |
| Moisture | 72.00±0.58 | 73.00±1.00 | 72.67±0.33 | 72.33±0.88 |
| Cp | 72.00±0.58$^{b}$ | 72.67±0.33$^{ab}$ | 73.67±0.33$^{a}$ | 73.00±0.58$^{ab}$ |
| EE | 23.50±0.61 | 23.57±0.52 | 22.33±0.30 | 22.73±0.38 |
| Ash | 4.50±0.06 | 3.77±0.64 | 4.00±0.10 | 4.27±0.94 |

a-c Means in the some row with different superscripts differ significantly at ($P < 0.05$).

# تأثير استخدام نبات الغاب كعلف اخضر أوسيلاج ودريس في علائق الحملان الرحمانى على مكونات الدم ومواصفات جودة الذبيحة

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تهدف هذه الدراسة الى استكمال تقييم التغذية على نبات الغاب، لذا اهتمت بقياس التغيرات في خصائص الذبيحة وقياسات الدم عند التغذية على الغاب إما أخضر طازج او سيلاج أو دريس فى علائق الحملان الرحماني النامية، وقد اظهرت النتائج أن معظم قياسات الدم لم تتأثر معنويا باختلاف المعاملات التجريبية المستخدمه، ولكن الهيموجلوبين ومتوسط تركيز هيموجلوبين الخلية والخلايا الليمفاوية زادت بدرجة معنوية مع سيلاج الغاب مقارنة بدريس الغاب. وقد لوحظ نفس الاتجاه مع البروتين الكلي والجلوبيولين. اما قياسات الدم الأخرى لم تتأثر معنويا مع اختلاف العلائق المختبرة. اما فيما يتعلق بقطعيات الذبيحة فقد أظهرت زيادة معنوية في وزن الكتف والأفخاذ فى مجموعتى سيلاج الغاب والغاب الاخضر مقارنة بدريس الغاب ، كما اظهرت القطعيات الممتازه زيادة فى الوزن مع سيلاج الغاب وتلتها المغذاة على الغاب الاخضر ثم دريس الغاب و دريس البرسيم. زاد ايضا وزن العضلة العينية فى المجموعة المغذاة على سيلاج الغاب (530جم) و المجموعة المغذاة على الغاب الاخضر ( 524جم) مقارنة بمجموعتى دريس البرسيم ودريس الغاب ( 479 ، 462جم على التوالى) ، لذلك زاد وزن اللحم زيادة معنويه فى كلا من مجموعتى سيلاج الغاب و الغاب الاخضر مقارنة بمجموعتى دريس البرسيم و دريس الغاب، كذلك أخذ دهن اللحم نفس الاتجاه بين المعاملات المختلفة، وقد تلاحظ أن الأغنام المغذاة على عليقة دريس الغاب أعطت أقل قيمة فى مقياس مساحة العضلة العينية بينما سجلت أعلى قيمة للأغنام المغذاة على عليقة سيلاج الغاب والإختلافات كانت معنوية.

**من هذه الدراسة نخلص الى ان عليقة سيلاج الغاب هى الافضل فى نسبة التصافى ووزن الذبيحة ومعظم قياسات الغاب ودريس البرسيم فى جودة اللحم، وعند مقارنة سيلاج معظم قياسات صفات اللحم وصورة الدم، فإنه يمكن استخدام الغاب كبديل جيد للاعلاف الصيفية مثل دريس سيلاج البرسيم الذى اصبح قليلا وذو سعر مرتفع**

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