# Voluntary intake and digestibility by sheep of barley straw with and without soybean meal supplement.

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SUMMARY

Barley straw from four varieties ( Arabi Abied (AA), ERJApam (ER), C63 (C63) and Beecher (BE) ) with and without soybean meal supplement were compared for differences in voluntary feed intake and digestibility. Two sets of Latin Square Design with four mature Awassi male sheep were used.

The results showed that the mean intakes of barley straw were 41.2, 34.8, 30.6 and 25.6 g/kg $W^{0.75}$ for the four varieties AA, ER, C63 and Be, respectively and 41.7 and 24.4 g/kg $W^{0,75}$ with and without supplementation of soybean meal, respectively. However, there was a significant ($P<0.05$) difference between the intake of AA variety and the other varieties of barley straw. Supplementation with soybean meal increased apparent dry matter digestibility, but this was not significant.

## INTRODUCTION

In the dry areas, barley straws are becoming an important component of sheep diets and there is an increased use of these agricultural residues in the production systems (Thomson, 1987).

In the experiments reported herein the intake and digestibility of barley straw with and without soybean meal supplement by sheep was studied.

## MATERIALS AND METHODS

**Animals:**

Eight mature male Awassi sheep with an average live weight of 55 kg were used.

**Diets:**

Straw from four varieties of barley namely, Arabi Abied (AA), ER/Apam (ER), C63 and Beecher (BE) harvested from the experimental plots of the International Centre for Agricultural Research in Dry Areas (ICARDA) was used. The straw was weed-free and ground mechanically through a screen to a 2cm length before given to sheep.

**Feeding and Management:**

The animals were housed in individual cages and the straw was offered *ad libitum* with and without soybean meal supplement.

The straw was provided in equal amounts twice a day at 0800 and 1400 hour. The water was provided twice daily in the morning and afternoon. Twenty grammes of minerals, vitamins and trace elements supplement was given daily. The sheep were weighed --three times, during the adaptation period, before and after the end of the experiment. Feed, feed refusal and faeces were weighed the last 10 days for each period and sub samples (10%) were taken from each sheep during collection period. Soybean meal supplement was given every day at the rate of 12 gm/100 gm of straw before the straw was offered and its amount depended on the intake. Faeces were collected once every 24 hour at 0800 am. from the boxes of the cages of each sheep.

Temperature in the digestibility room was recorded daily. The feed offered was calculated according to the intake of the previous day as follows:

- If the refuse was less than 10% amount of feed offered, then 100 gm were added.
- If the refuse was more than 20% of amount of feed offered, then 100 gm were reduced.
- If the refuse was between 10-20% of amount of feed offered, then the amount was left unchanged.

However, during the first three days, the sheep were gradually given increasing amount of barley straw. The experimental period was 28 days for four periods (112 days).

**Chemical Analysis:**

**Each sample of feed, feed refusals and faeces was dried in a forced-draught oven at 105 °C for 24 hours to constant weight. Then it was ground through a 2mm screen mill before analysis for Ash, NDF, CP, IVDMD and IVOMD. The chemical analysis were carried out according to Williams, *et al.* (1988) and A.O.A.C. (1975).**

**Statistical Analysis:**

**The results were analysed by analysis of variance by Genstat Analysis (Lawes Agricultural Trust, 1987).**

## RESULTS

**The average feed intake of the sheep during the 120 days experimental period is shown in Table (1). The mean intake of barley straw for each variety was significantly higher (P<0.05) with supplements of soybean meal. There was a significant difference (P<0.05) between the intake of AA and the intake of the other varieties of barley straw. However, no significant difference in the intake between ER. C63 and BE. On the other hand the protein supplements for all varieties increased straw dry matter intake. The improvements in intake were statistically significant (P<0.05).**

**Table 1. Average feed intake of barley straw (g/kg W $^{0.75}$) by sheep as influenced by soybean meal supplement.**

| | Intake | | | | Mean |
|---|---|---|---|---|---|
| | AA | ER | C63 | BE | S.E. 2.14 |
| Straw + Soybean meal | 31.9 | 23.4 | 19.6 | 22.7 | 24.4[b] |
| Straw alone | 50.5 | 46.1 | 41.6 | 28.5 | 41.7a |
| | | | S.E. 1.115 | | |
| Mean | 41.2[a] | 34.8[b] | 30.6[b] | 25.6[b] | 33.0 |

**Means in the same column and row with different superscripts are significantly different (P<0.05).**

**Table (2) gives the mean of DOMD in both feed and refusals. There was little increase, with soybean meal supplement, but the difference was not significant.**

Table **2.** *In vitro* organic matter digestibility of barley straw **and** feed refusals as influenced by varieties and soybean meal supplementation.

| | DOMD of feed | | | | Mean |
|---|---|---|---|---|---|
| | AA | ER | C63 | BE | S.E. 0.248 |
| Straw alone | 27.0 | 27.9 | 27.7 | 25.5 | 27.04[a] |
| Straw + Soybean meal | 27.0 | 27.9 | 27.9 | 25.5 | 27.08! |
| | | | **S.E. 0351** | | |
| Mean | 27.0[a] | 27.9a | 27.8[a] | 25.5[a] | 27.06 |
| | | | **DOMD % of Refuse** | | |
| | AA | ER | C63 | BE | S.E. 0.789 |
| Straw alone | 25.8 | 26.6 | 25.2 | 26.2 | 25.93[a] |
| Straw + Soybean meal | 25.9 | 29.7 | 26.5 | 24.6 | 26.66[a] |
| | | | **S.E. 1.115** | | |
| Mean | 25.8[a] | 28.1[a] | 25.8[a] | 25.4[a] | 26.29 |

Means in the same column and row for each table with same superscripts are not significant (P<0.05).

The apparent dry digestibility of the diets are given in Table (3). Supplementation with soybean meal increased apparent dry matter digestibility, except treatment Be which was decreased.

**Table 3.** Apparent dry matter digestibility (%) of barley straw by sheep as influenced by different varieties and soybean **meal** supplementation.

| Diet | Period | | | | Mean |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | |
| AA (+) | 89.6 | 87.9 | 84.5 | 84.1 | 86.5 |
| AA (-) | 83.1 | 85.8 | 84.5 | 80.8 | 83.6 |
| ER (+) | 88.6 | • 84.9 | 89.2 | 85.8 | 87.1 |
| ER (-) | 83.9 | 76.0 | 78.5 | * | 79.5 |
| C63 (+) | 88.0 | 86.8 | 90.1 | 85.8 | 87.7 |
| C63 (-) | 66.1 | * | 83.6 | 83.4 | 76.7 |
| Be (+) | 80.3 | 71.4 | 84.5 | 82.4 | 79.7 |
| Be (-) | 83.4 | 83.9 | 82.7 | * | 83.3 |

*Straw with soybean meal supplement.*
*Straw alone.*
*Period with missing values.*

## DISCUSSION

The improved quality of straw due to supplement of soybean **meal** led to higher feed intake. This finding agrees with that of Church **and** Santos (1981) who reported that voluntary intake of wheat straw was increased by addition of 1 gm or more of soybean meal protein.

The significant differences between *in vitro* organic matter digestibility and *in vitro* dry matter digestibility of barley straw without and with soybean supplement, is due to the differences in nitrogen content of straws after soybean supplementation. **0'** Donovan and Khadaki (1973) concluded that sheep fed on straw alone, as expected, more excreted nitrogen in faeces than was present in the feed.

Soybean supplementation to barley straw increased the apparent dry matter digestibility of the straw, but this increase was not significant and this might be due to the small change in nutritive value of straw. Al Saghier and Campling (1991) have reported that there was a tendency for digestibility of straw to increase when urea or soybean meal were given, however, the effect was not significant.

The addition of protein source as supplement i.e. soybean meal, to barley straw, improved the quality which in return increased **the** voluntary feed intake significantly. Also there was some improvement in dry matter digestibility of straw. Hence, there was indication of body weight maintenance and better performance.

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# التناول الطو عي ومعامل هضم في الأغنام التين الشعير المدعم بمسحوق فول الصويا أو بدونه

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**ملخص البحث**

قورنت اربعة أصناف من تين تشعير ( **BE , C63 , ER , AA** ) وذلك لدراسة الفرق بينها في التناول تطوعي للغذاء ومعامل الهضم عند تدعيمها بمسحوق فول الصويا او عدمه

استخدمت مجموعتين من تصميم المربع تلاقيني في كل منها أربعة ذكور بالغة من أغنام العراسي . أوضحت النتائج بأن متوسط تنزل من الشعير قد كان 41 34.8 ( 30.6 و 25.6 جرام / كيلوجرام وزن ليضي ( الوزن 0.35 ) للأصناف الأربعة يمسحوق فول الصويا و لكونه علي التوالي تفرق بين تناول الصنف **AA** و العينات الأخري من الذين كان معنويا ( ح = 15 ) . رفع لتدعيم بمسحوق فول الصويا معال الهضم الطاهري للمادة الحالية لكنه كان ارتفاعا غير معتري أحصائيا