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IN VIVO DIGESTIBILITY AND NUTRITIVE CHARACTERISTCS OF DIETS CONTAINING ALMOND HULLS SUPPLEMENTD WITH UNDECORTICATED SUNFLOWER OILSEED MEAL [1].

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SUMMARY

Four *in vivo* digestibility tests have been carried out on rams of Gentile di Puglia breed fed ad libitum on the following diets: almond hulls alone (AH), AH and soyabean oilseed meal, undecorticated sunflower oilseed meal (USUM) and AH, undecorticated safflower oilseed meal (USAM) and AH. The research has shown that AH cannot be given alone to sheep due to its low proteic content and the reduced C.U.D.% of some nutritive principles. The diets containing this by-product supplemented with either sunflower oilseed meal or safflower oilseed meal have presented good results as regards C.U.D.% of both nutritive principles and the nutritive value of the diet. The best results have been obtained when utilizing sunflower oilseed meal.

INTRODUCTION

In the general view of the recovery of agricultural by-products for animal feeding, an important role is attached to almond hulls (Sequeira and Law, 1970; Buttery et al., 1980; Saura Calixto et al., 1983; Alibes et al., 1983; Aquilar et al., 1984; Pinto et al., 1989; Vonghia et al., 1989; 1992) which, even though poor in proteins and rich crude fibre (Saura Calixto and Canellas, 1982; Pinto et al., 1989), can be successfully utilized in diets for ruminants if only supplemented with proteic feeds (Pinto et al., 1989; 1990; Vonghia et al., 1989). Among the latter great importance is attached to sunflower oilseed meal, not only for its availability in our country, but also for the good quality of proteins and the lack of toxic and antinutritional substances (Rahma and Narasinga Rao, 1979; Galoppini and Costanzi, 1981; Galoppini and Fiorentini, 1981; Jaya et al., 1981).

MATERIALS AND METHODS

In order to evaluate the opportunity of utilizing in ruminant feeding oilseed meals as proteic supplementation in diets based on agricultural by-products, it has seemed useful to determine the digestibility and the nutritive value of four isoproteic diets. The first was made up of almond hulls alone (AH); the second contained 20% of soyabean oilseed meal and 80% of AH; the third 50% of AH and 50% of undecorticated sunflower oilseed meal (USUM); the fourth 50% of AH and 50% of undecorticated safflower oiseed meal (USAM). The chemical characteristics of the diets and the feeds are reported in table 1.

The experimental methodologies utilized are the ones suggested by the A.S.P.A. (1980, 1982), whereas the nutritive characteristics of feeds were calculated according to I.N.R.A. indications (1978).The obtained data have been subjected to the analysis of variance by utilizing the following statistical method (Pilla, 1985):

$$Y_{ij} = M + A_i + E_{ij}$$

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where M = general mean;

Ai = effect due to the ieth diet;

Eij = residual error.

The difference among the estimated means have been compared by Student 's "t"(S.A.S., 1985)

RESULTS AND DISCUSSION

The lower and significative (P < 0,01) food consumptions have been observed in rams fed on diets containing both USAM and AH alone and this can be due to the bitter flavour of the feed for the presence of phenolic glucosides (Lyon et al., 1970). Between these diets, above all as concerns the consumption of dry and organic matter, no valid differences have been observed. On the contrary, these differences are significative (P<0,01) when considering crude protein, crude fat, ashes and N-free fraction.

Equal statistics have been observed between the diet containing soyabean oilseed meal and the diet containing USUM. For most nutritive principles of these two diets, the significance of the differences observed reaches levels of 99%.

Table 1 - Chemical composition of feeds and mixtures (% d.m.).

	Almond hulls	*Soyabean oilseed meal*	*Sanflower meal*	*Sunflower meal*	*Almond hulls + soyabean oilseed meal*	*Almond hulls + sunflower*	*Almond hulls + safflower*
Moisture	**13,73**	**19,94**	**11,01**	**11,13**	**14,77**	**12,37**	**12,35**
Crude protein (N x 6,25)	**5,95**	**47,56**	**16,62**	**28,14**	**12,91**	**14,62**	**11,37**
Ether extract	**3,16**	**2,04**	**14,01**	**18,16**	**2,97**	**9,53**	**8,67**
Ash	**12,26**	**6,87**	**2,91**	**5,80**	**11,36**	**10,25**	**7,51**
Crude fibre	**18,65**	**7,07**	**30,77**	**21,81**	**16,71**	**23,00**	**24,80**
N-free extract	**59,98**	**36,46**	**35,69**	**26,09**	**56,05**	**42,60**	**47,65**
N.D.F.	**39,71**	**13,55**	**43,11**	**33,80**	**35,34**	**34,52**	**41,43**
A.D.F.	**39,33**	**10,09**	**35,00**	**21,83**	**34,44**	**21,49**	**37,13**
A.D.L.	**20,65**	**1,17**	**12,12**	**7,93**	**17,39**	**2,98**	**16,32**
A.I.A.	**0,74**	**0,39**	**1,29**	**-**	**0,68**	**-**	**1,02**
N.D.S.	**60,29**	**86,45**	**56,89**	**66,20**	**64,66**	**65,48**	**58,57**
Hemicellulose	**0,38**	**3,46**	**8,11**	**11,97**	**0,90**	**13,03**	**4,30**
Cellulose	**17,94**	**8,53**	**21,59**	**13,90**	**16,37**	**18,51**	**19,79**

Table 2 - Digestibility coefficients.

	Almond hulls	*Almond hulls+ soyabean oilseed meal*	*Almond hulls+ sunflower*	*Almond hulls+ safflower*	M.S.E.. (G.L. = 14)
Dry matter	43,45	b 41,63	a 49,89	47,28	22,75
Organic matter	43,23	b 41,42	a 50,36	47,72	22,90
Crude protein (N x 6,25)	C - 17,92	B 30,83	A 55,89	A 55,06	104,39
Ether extract	C - 1,86	B 33,72	A 79,36	A 83,48	32,27
Ash	45,11	43,39	45,91	41,94	26,38
Crude fibre	b 17,93	Bc 5,60	Aa 32,43	bc 13,08	57,64
N-free extract	59,46	a 54,79	b 52,94	57,49	14,58
N.D.F.	B 12,35	C - 9,65	A 41,35	B 7,02	67,31
A.D.F.	B 12,24	C - 11,57	A 31,41	B 5,18	62,19
A.D.L.	B - 5,48	C - 50,01	A 64,15	B - 15,42	108,27
A.I.A.	A 52,61	C - 47,90	ABa 39,02	Bb 12,20	306,91
N.D.S.	B 64,09	B 67,78	C 55,42	A 75,77	12,06
Hemicellulose	13,73	54,14	67,19	22,94	2011,65
Cellulose	A 30,36	A 28,07	B 0,49	A 21,80	45,77

Table 3 - Nutritive characteristics.

	Almond hulls	Almond hulls+ soyabean oilseed meal	Almond hulls + sunflower	Almond hulls + safflower
G.E. (MJ/Kg d.m.)	16,5310	17,0710	19,0790	18,4390
dE	0,3984	0,3858	0,4450	0,3950
D.E. (MJ/Kg d.m.)	6,5860	6,5860	8,4980	7,2760
M.E. (MJ/Kg s.s.)	5,389	5,376	6,999	5,937
Milk F.U. /Kg d.m.	0,4030	0,4000	0,5330	0,4430
Meat F.U../Kg d.m..	0,3006	0,2936	0,4190	0,3290
N.L.	0,6800	1,0200	1,6710	0,8800

Table 4 - Live weinght, metabolic .weinght and daily intake (dry matter and digestible protein).

	Almond hulls	Almond hulls+ soyabean oilseed meal	Almond hulls + sunflower	Almond hulls + safflower
Initial live weight (Kg)	62,22	65,75	65,68	57,45
Metabolic weight (Kg/l w.^{0,75})	22,15	23,09	23,070	20,87
Total dry matter (g)	1019,33	1627,54	1996,87	920,12
Dry matter (g/Kg l.w.^{0,75}).	46,01	70,49	86,56	44,09
Total digestible protein (g)	10,02	78,54	152,31	57,60
Digestible protein (g/Kg l.w.^{0,75})	0,49	3,40	6,60	2,76

The observed digestibility coefficients (C.U.D.%) of many nutritive principles even though with a different level of statistical validity (P<0,01) result lower when the animals are fed on AH alone, probably due to its low proteic and lipidic content (Table 2)., The best and significative digestibility performances (P < 0,05) for dry and organic matter and N-free fraction have been observed in rams fed on AH and USUM than in the ones receiving the diet containing soyabean meal. This group of animals presents, in general, the best digestive utilization of crude protein, crude fat, ashes, crude fibre and several fibrous fractions, even though the observed differences with the other diets not always reach valid levels of statistical significance. The higher ingestion in nutritive principles, even referring to the metabolic weight of the animals (Table 4) and the best digestive utilization of the same present in the USUM diet have determined a ligher content in D.E., M.E., and a ligher nutritive value in milk F.U. and meat F.U.

CONCLUSIONS

The trial has put in evidence that AH appropriately supplemented can be an useful by-product for ruminant feeding. In particular, the supplementation of the diet with USUM determines, above all in comparison with the one containing soyabean meal, an improvement of both the digestive utilization of most nutritive principles and the nutritive value. At the light of these results, it can be affirmed that USUM can be successfully utilized in diets for ruminants.

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