The Role of Multinutrient Blocks for Sheep Production in an Integrated Cereal-livestock Farming System in Iraq

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Abstract
One of the main limiting factors affecting sheep production in Iraq is the shortage of feed resources, especially protein. Cereal stubble grazing and hand-feeding of chopped straw are the main components of the sheep diet for a considerable part of the year.

Multinutrient blocks were manufactured from urea and locally available agro-industrial by-products. The potential of multinutrient blocks as supplementary feed for sheep was investigated in several on-station and on-farm experiments. The results of these experiments indicate the value of multinutrient blocks as supplementary feed for sheep in Iraq. Using multinutrient blocks during cereal stubble grazing improved the ewes' weight gain (47-100%), conception rates (7-27%) and twinning percentage(26%). Using multinutrient blocks during the ewes' hand-feeding period resulted in replacement of 40% of costly barley grain. The adoption of multinutrient blocks by sheep owners is considered as a major breakthrough in animal feeding in Iraq. Although this technique was introduced to Iraq only a couple of years ago, the total of multinutrient blocks produced during 1995-96 campaign has reached 15,000 tons manufactured mainly by private plants (13 out of 14), and used by nearly 4,000 sheep owners buying the blocks at cost price plus 30% marginal profit.

KEY WORDS: multinutrient block, urea, sheep, stubble, straw, agro-industrial by-product, supplement, barley

Introduction

One of the main factors limiting sheep productivity in Iraq is the shortage of feed resources which can meet their nutrient requirements. This is due to the deterioration of the rangeland and shortage of green forages resulting from the priority for cultivation of land for human food and cash crops. The shortage of feed grain (barley), which is diverted to human consumption, is another factor behind the reduction in sheep productivity. On the other hand, there has been a considerable increase in the available quantity of crop residues in recent years, mainly due to the expansion in food crop production. These residues contribute about 45% of total feed resources available for ruminants in Iraq. There are constraints to the use of these crop residues in ruminant feeding due to their low energy digestibility (35-45%)and low protein content(3-4%).

Sheep Feeding System

Sheep feeding systems in Iraq are well integrated with the cereal cropping system. Sheep depend mostly on grazing cereal stubble, hand-fed chopped straw (*tibin*) and whole barley grain for a considerable part of the year.

During summer (June-September), which coincides with the mating season, sheep depend mainly on cereal crop residues from stubble grazing. No supplement is given during this time. In winter sheep depend on hand feeding which is mainly tibin and whole barley grain. Some sheep owners move their flocks to the desert and steppe. The majority of ewes are in late pregnancy and early lactation during this period which has the highest nutrient requirement. In spring, when ewes are in mid to late lactation the natural pasture can support requirements, depending on rainfall and temperature during the previous winter.

This type of feeding system is likely to result in a serious protein deficiency, especially during summer (stubble grazing) and winter (hand feeding) which may explain the low productivity of sheep in Iraq.

With the existing sheep feeding system, strategic supplementation is the most appropriate way to improve sheep productivity. Experience in other countries has shown that multinutrient blocks manufactured from urea and agro-industrial by-products can be used as a supplement for

improving the productivity of sheep which are dependent on low, quality roughage as their main diet (Sansoucy *et al.*, 1988; Leng *et al.*, 1991; Hadjipanayiotou *et al.*, 1993b).

Recently, the IPA Agricultural Research Center in cooperation with Mashreq Project(ICARDA/UNDP/AFESD.RAB.89/026, Iraq, Jordan and Syria) has successfully implemented a project to produce and disseminate multinutrient block technology among sheep owners in Iraq.

Manufacture of Multinutrient Blocks

The manufacture of multinutrient blocks(MB) without any molasses was promoted by the Food and Agricultural Organization of the United Nations in different parts of the world (Hassoun, 1989; Hadjipanayiotou *et al.*, 1993a). In Iraq, different MB formulae were used with different levels of urea, binders and varieties of agro-industrial by-products which are available locally (Table 1). The main ingredients were high moisture by-products (date pulp, sugar beet pulp, brewers' grains, tomato pomace and whey) together with poultry litter, wheat bran, rice bran and ground corn cobs. The other ingredients were fertilizer grade urea as a source of nitrogen, calcium sulphate and salt (NaCl). Quick lime was used as a binder. Inclusion of high moisture date pulp which is available in Iraq in commercial quantities gave excellent hardness and compactness. Therefore our strategy was to use this top quality feedstuff as the main ingredient in the blocks in the manufacturing plants.

Effect of Using Multinutrient Blocks on Weight Gain of Awassi Sheep Grazing Cereal Stubble

Several on-station and on-farm experiments were conducted to evaluate the use of multinutrient blocks as supplementary feed for Awassi sheep grazing cereal (wheat and barley) stubble as their basal diet. The results of an on-station experiment (Table 2) with yearling rams showed that using multinutrient blocks as supplementary feed during cereal stubble grazing could replace costly cotton seed meal(CSM). Both groups gained weight (100 and 93 g/head/d for multinutrient blocks group and CSM group respectively).

Table 1: Some formulae of multinutrient blocks manufactured in Iraq.

	Formulae No									
Ingredients	1	2	3	4	5	6	7	8	9	10
Urea	7	8	6	7	5	5	7	4	7	6
Wheat bran	32	20	27	25	32	32	30	10	17	22
Rice bran	22	15	-	-	-	-	5	5	-	5
Poultry litter	20	-	-	5	5	5	5	35	5	15
Date pulp	-	38	-	35	46	-	-	-	35	10
Beet pulp	-	-	-	-	-	46	22	-	-	-
Brewer grain	-	-	45	-	-	-	-	-	-	-
Tomato pomace	-	-	-	-	-	-	-	-	-	12
Ground straw	-	-	-	-	-	-	-	-	8	-
Corn cobs	-	-	5	10	-	-	-	-	10	11
Reed	-	10	-	-	-	-	10	34	-	-
CaO	12	10	10	12	8	8	14	6	12	12
CaSO4	2	2	2	2	1	1	2	1	2	2
Salt	5	5	5	5	3	3	5	4	5	5
Whey	-	-	-	-	-	-	-	1	-	-

Feeding Awassi ewes multinutrient blocks (Table 2) during cereal stubble grazing improved their weight gain by about 72% and 21% as compared to control (no supplement)group and sunflower meal supplement groups respectively. Similar trends were observed in the on-farm experiments which were conducted in three villages in Mosul area (north of Iraq) (Table 3). Ewe weight gain increased considerably(48-400%) as a result of multinutrient block supplementation as compared with farmer practice (no supplement). The response to feeding multinutrient blocks in on-farm experiments were even more pronounced than that obtained on-station. Better responses could be due to a longer grazing time than the ewes on the station.

Table 2: Effect of using multinutrient blocks on weight gain of Awassi sheep grazing cereal stubble,(On-station, Baghdad)

Experiment 1(yearling rams)	MB	CSM
No. of animals	11	11
Initial Weight(kg)	41.6	41.8
Final Weight(kg)	46.15	46.2
Weight gain(g/d)	100	93
Supplement intake(g/d)	122	100

Experiment 2(ewes)	No supplement	MB	SSM
No. of ewes	29	28	30
Initial Weight(kg)	39.5	39.6	39.4
Final Weight(kg)	41.9	43.7	42.4
Weight gain(g/d)	30	51	44
Supplement intake(g/d)	-	144	150

MB=Multinutrient Blocks
CSM=Cotton seed meal
SSM=Sunflower seed meal

Table 3: Effect of multinutrient blocks (MB) on weight gain of Awassi ewes grazing cereal stubble (on-farm, Mosul area)

	Village					
	Al-Shallat		Al-Muside		Al-Irbid	
	C	MB	C	MB	C	MB
No. of ewes	49	48	28	27	30	30
Initial weight(kg)	46.9	47.2	48.4	44.4	46.6	46.0
Final weight(kg)	47.7	51.2	50.8	53.6	48.5	48.8
Weight gain(g/d)	8	40	66	115	52	77
Blocks intake(g/d)	-	150	-	243	-	252

C=Farmer practice(No supplement)
MB=Multinutrient blocks

These results confirmed previous studies which indicated that multinutrient blocks improved the weight gain of ewes dependent on low quality forages as their main diet (Habib *et al.*, 1991, Hendratno *et al.*, 1991 and Hadjipanayiotou *et al.*, 1993b).

Effect of Multinutrient Blocks Supplementation on the Reproductive Performance of Awassi Ewes.

Farmers in Iraq do not use any supplementation for ewes grazing on cereal stubbles during the mating season. The lengthy mating season together with no supplementation may be responsible for the low conception, lambing and twinning rates.

The effect of using supplementary feed on the reproductive performance of Awassi ewes grazing cereal stubble has been investigated in one on-station experiment. The results of this experiment are presented in Table 4. Using during stubble grazing multinutrient blocks enriched with cotton seed meal (a source of by-pass protein) and vitamin A, D and E resulted in considerable improvement in conception rate (11%), lambing percentage (26%), cycling activity and twinning percentage (15%) as compared to the control non-supplemented group. Supplementation with multinutrient blocks also considerably improved the reproductive performance of goats (Hendratno *et al.*, 1991).

The improvement in the reproductive performance of Awassi ewes due to feeding multinutrient blocks can be considered the most important aspect of this technology in Iraq and in WANA countries where sheep depend heavily on cereal stubble grazing during the mating season.

Using Multinutrient Blocks As Supplementary Feed During Sheep Hand-feeding Period

The hand-feeding period is considered the most critical time for sheep farmers in Iraq because of the shortage of grazing. Currently, sheep depend on whole barley grain and stored chopped straw (tibin) as their main diet. Barley grain is directed to human consumption in Iraq and there is therefore great interest among farmers in replacing barley grain with other cheaper feed resources.

Table 4: Effect of multinutrient blocks on reproductive performance of Awassi ewes grazing cereal stubble (on-station)

Measurements	C	MB
No. of ewes	27	27
No. of ewes lambed	21	24
No. of ewes lambed from 1st cycle	12	16
No. of ewes lambed from 2nd cycle	7	8
No. of ewes lambed from 3rd cycle	2	-
No. of ewes giving twin	3	7
Conception rate(%)	78.0	89.0
Lambing(%)	89.0	115
Twinning(%)	11.0	26.0
Block intake	-	227

C: Farmer practice (no supplement)
MB: Multinutrient blocks

Using multinutrient blocks during the hand-feeding period, which coincides with the ewes' late pregnancy and early lactation was tested by on-station and on-farm experiments. The results of the on-station experiment (Table 5) showed that using multinutrient blocks or sunflower seed meal as protein supplements resulted in a significant reduction in the amount of barley grain required (40%) as compared with the control group. The results of on-farm experiments, which were conducted at two locations in the Mosul area, gave a better indication of the benefit of using multinutrient blocks during the hand-feeding period. These results (Table 6) showed that using high energy MB resulted in a significant replacement of costly barley grain (50-100%). The majority of the farmers who used multinutrient blocks for sheep feeding during the last three years observed that they can successfully replaced of 50% of barley grain. We believe this is the main reason behind the success of multinutrient blocks in Iraq.

Table 5: Effect of feeding multinutrient blocks on the performance of Awassi ewes during late pregnancy and lactation period (on-station)

	Control	Multinutrient Blocks	Sunflower seed meal
No. of ewes	23	22	22
Days on test	132	132	132
Initial ewe weight(kg)	44.67	42.09	43.35
Final ewe weight(kg)	43.13	41.63	40.81
Lambs birth weight(kg)	4.84	4.71	4.83
Lambs weaning weight(kg)	25.41	24.24	24.43
Milk yield(g/ewe/d)	402	888	867
Feed Intake(g/ewe/d):			
Whole barley grain	660	430	430
Wheat bran	400	360	360
Straw	527	416	390
Blocks	-	268	-
Sunflower seed meal	-	-	185

Table 6: Effect of feeding multinutrient blocks (MB) on the performance of ewes during late pregnancy and early lactation (on-farm, Mosul area)

	Nazah area		Al-Jernaff area	
	Control	MB	Control	MB
No. of ewes	20	20	15	15
Days on test	85	85	72	72
Initial ewe weight(kg)	51.9	52.5	48.3	47.6
Final ewe weight(kg)	37.1	37.4	40.5	42.6
Lambs birth weight(kg)	3.2	3.1	3.2	3.1
Lambs weight at 8 weeks(kg)	12.3	13.4	13.2	11.7
Milk yield(gld)	342	358	500	362

Table 6 (Continued):

	Nazah area		Al-Jernaff area	
	Control	MB	Control	MB
Feed Intake(g/ewe/d)				
Whole barley grain	412	-	712	356
Straw	265	500	370	370
Block	-	347	-	416
Feed cost(L.D/head)	2326	1442	3341	2614

Price of straw = 100 I.D./ton
Price of barley grain = 60000 I.D./ton
Price of MB = 27000 I.D./ton

Transferring Multinutrient Blocks Technology to Sheep Owners and Manufacturers in Iraq

The success in transferring multinutrient block technology to sheep owners and manufacturers in Iraq was mainly due to adoption of step-by-step methodology (Mohammed *et al.*, 1995).

This methodology consisted of the following stages:

. Initial experimentation in the manufacture of multinutrient blocks.
. Testing the manufactured blocks in several on-station trials together with chemical analysis to evaluate the nutritional value.
. Conducting on-farm trials to verify the results obtained at the research station and testing the degree of acceptance of the new feed source by sheep owners.
. Conducting field day demonstrations in various parts of the country to show the animal owners the importance of blocks as top quality supplement.
. Conducting training courses for extension workers of the Ministry of Agriculture to gain their active involvement in disseminating the new technology.
. Expansion of the production of multinutrient blocks through contracts with private investors.
. Large scale adoption and dissemination of the new technologies through provision of inputs and technical support.

Conclusions

The success of multinutrient blocks technology is considered as the major breakthrough in animal feeding in Iraq. This is mainly due to wide ranging adoption of the technology by manufacturers and sheep owners. It is well established that using multinutrient block improved the performance of sheep during stubble grazing and considerably reduced feed cost during the hand-feeding period.

The methodology of making multinutrient blocks is simple and does not need sophisticated equipment. Also multinutrient blocks can be made by making use of a wide variety of by-products which are available locally. With increasing demand for multinutrient blocks by animal owners, fourteen manufacturing plants have been established in various provinces in Iraq.

The total of multinutrient blocks produced by IPA and the private plants during 1995-1996 season was 15000 tons which were distributed to 3986 sheep owners at cost price plus 30% marginal profit.

References

Habib G., Basit Ali Shah S., Wahidullah G. and Ghuffranullah. 1991. The importance of urea-molasses blocks and by-pass protein in animal production. The situation in Pakistan. 133-145. In Isotope and Related Technigues in Animal Production and Health by International Atomic Energy. Vienna.

Hadjipanayiotou, M., Verhaeghe, L., Allen, M., Kronfoleh, A. R., Labban, L. M., Shurbaji A., Al-Wadi M., Dassouki M., Shaker B. and Amin M. 1993a Urea blocks. I. Methodology of block making and different formulae tested in Syria. Livestock Research for Rural Development 5(3).

Hadjipanayiotou, M., Verhaeghe. L., Kronfoleh, A. R., Labban, L. M., Amin, M., Al-Wadi, M., Badran A., Dawa, K., Shurbaji, A., Houssein, M., Malki, G., Naigm, T., Merawi, A. R. and Harres, A. K. 1993b Urea blocks. II Performance of cattle and sheep offered urea blocks in Syria. Livestock Research for Rural Development 5(3).

Hassoun, P. 1989. Manufacture of urea block without molasses. Mimeogragh, FAO, Rome, Italy.

Hendratno, C., Nalan, J. V. and Leng. R. A. 1991. The importance of urea-molasses multinutrient blocks for ruminant production in Indonesia. 157-169. In Isotope and Related Techniques in Animal Production and Health by International Atomic Energy Agency. Vienna.

Leng, R. A., Preston, T. R., Sansoucy, R. and George Kunju, P. L. 1991. Multinutrient blocks as a strategic supplement for ruminants. World Animal Review 67:11-19.

Mohammed. A. H., Salman, A. D., Shideed, K. H. and Sudad, S. H. 1995. The mechanism of feed block technology transfer to manufacturers and sheep owners. Regional Symposium on Integrated crop-livestock systems in the Dry Area of West Asia and North Africa, 6-8 November, Amman, Jordan.

Sansoucy, R., Aarts, G. and Preston, T. R. 1988. Molasses-Urea blocks as multinutrient supplement for ruminants. In Sugarcane as Feed, Proc. of an FAO Experts consultation held in Santo Domingo, Dominican Republic, 7-11/7/1986. FAO Animal Production and Health Paper No 72. 319 pp.