



# DESERT DEN NEWS

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## SOLAR COOKER FOR ANIMAL FEED

During the survey of rural arid areas, it was found that huge amount of firewood, animal dung cake and agricultural wastes are burnt for boiling of animal feed using traditional fuel wood stove. The solar cookers available are costly and cook only 2 kg of animal feed per day. Considering this, a novel solar cooker using locally available materials e.g. clay, pearl millet husk and animal dung have been designed, developed and tested that can boil 10 kg of animal feed per day.

### Design

A pit of dimensions 1980 mm x 760 mm x 100 mm is dug in the ground. The clay, pearl millet husk and animal dung are mixed in equal proportion with water to make paste. 50 mm deep layer of this paste is provided at the bottom of the pit. The sides of the solar cooker are also made by the same material. 150 mm pearl millet husk insulation has been provided at the bottom. 24 SWG galvanised steel absorber painted with black board paint has been put over the insulation. Two glass covers (4mm thick) on a removable steel angle and wooden frame have been provided over it. Four aluminium pans (tagari) with lid can be kept inside cooking chamber for boiling of animal feed. The solar cooker for animal feed can also be constructed using brick/stone masonry or vermiculite- cement. Fig. 1 depicts installation of solar cooker for animal feed in the field.

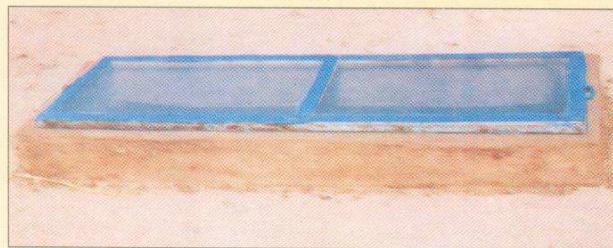


Fig. 1 Solar cooker for animal feed

### Performance

Crushed barley (Jau Ghat), guar korma, and gram churi with water were kept at 9 AM and can successfully be boiled by 4 PM. With the use of the solar cooker 10 kg animal feed can be boiled per day.

### Demonstration

Twelve low cost solar cookers for animal feed were installed at village Osia (Fig.2). The body of the cookers has been fabricated by an unskilled labour. Animal feed mixture cotton seed and oil cake have been successfully boiled by the farmers.



Fig. 2 Solar cookers for animal feed installed at village Osia

### Advantage

The solar cooker saves time of farm women and 1059 kg of fuel wood per year equivalent to 3611 MJ of energy. It is easy to fabricate at village level at a cost of about Rs 3500 per piece. Conservation of firewood help in preserving the ecosystem and animal dung cake could be used as fertiliser, which enhances agricultural productivity.

N. M. Nahar

## MULTI-NUTRIENT FEED BLOCK: AN APPROPRIATE MEANS FOR SUPPLEMENTATION OF ESSENTIAL NUTRIENTS TO DESERT LIVESTOCK

Rajasthan covers 3.42-lakh sq km area, which makes 10.4 % of total geographical area of our country. Of which, 62 % area is under hot desert (arid region) consisting of 12 districts in southwestern region. Due to low and erratic rainfall, agriculture becomes a gamble, and thus animal farming became a major occupation for the livelihood of the rural population particularly in the 12 western arid districts of the state. A study by the National Council of Applied Economic Research reported that revenue from milk sales alone accounted for 22 per cent of the family income in the state, as this state contributes 10% of the total milk produced in the country. The animal husbandry contributes 19 per cent of the state GDP. The livestock sector is more labour intensive than crop cultivation and accounts for a major share in rural employment with 4.5 per cent annual growth as compared to 1.75 per cent for all sectors and 1.1 per cent for agriculture.

Most of the livestock population in the arid regions are range managed, except during monsoon period, thrives upon dry grasses in the ranges and pastureland, and crop residues in the fallow lands. These grasses and crop residues are very low in essential nutrients including fermentable energy, protein, minerals and carotene, which is a precursor of vitamin A. The problem of mineral deficiency is further aggravated due to high calcium and very low phosphorus content of the crop residues. Calcium-phosphorus imbalance adversely affects the availability of calcium as well as the phosphorus. The dry fodder scarcity is as another problem. Even in the normal rainfall years, the dry fodder and green forages availability, respectively, is 30% and 59% of total requirement of the state. This situation is further worsens during drought years. Under such circumstances crop residues like straws and stovers are imported from the neighboring states. The productivity and survivality of desert livestock during scarcity and drought conditions can be ensured by supplementation of essential nutrients to these animals.

There are different means of supplementation of essential nutrients to the livestock, which are fully or mainly thrive upon roughage diet. The feed-block (Fig.1) is considered to be the most convenient and appropriate means of self-feeding of the nutrients by the livestock. Extensive studies on development of appropriate formulations and production technology of baked multi-nutrient feed block have been carried out at CAZRI and simple and

appropriate formulations, and process technology for production of baked multi-nutrient feed block, using locally available feed resources and the simple gadgets, which can be fabricated by local artisans, have been developed (Fig.2). In India and world over inorganic compounds like calcium/and or magnesium oxide, cement, gypsum etc., are being used as a binder, whereas, in CAZRI's feed block formulation, an organic plant product is being used as a binder. Elsewhere the blocks are dried by the exothermic reaction initiated by mixing chemically active substances, whereas, CAZRI's feed blocks are produced by drying in the solar or electrically operated dryers. Total 13 different formulations of compact feed blocks have been developed. In the standard formulation wheat bran, sugar cane molasses, urea, vitaminized mineral mixture, dolomite, common salt, deoiled soya bean meal, and the guar gum dust is used as a binder. It has been noticed that partial or complete replacement of wheat bran in block formulations with other fibrous feed ingredients like maize/barly milling products, malt sprouts, deoiled rice barn, Bajra husk, *Prosopis juliflora* ground pods, and *Neem & Ardu* leaves, though reduced production cost, but resulted into low density blocks. Pressing of high-fibre containing ingredient-mixture required more energy and resultant product will be of convex instead of flat, as desired in the final product. Due to low density of such blocks, these are liable to be over consumed by the animals; however, their bulk density can be improved by increasing the binding material. The partial or complete replacement of wheat bran with other fibrous materials reduced the bulk density and subsequently elevated compressive strength of the blocks, however, this rule does not hold true in case of the blocks in which the wheat bran has been fully replaced by chaffed *Cenchrus ciliaris* grass. Principal feed block ingredients and its appropriate substitutes have been listed in Table 1.

MNB supplementation in the livestock brought out an appreciable improvement in the health and productivity of the animals. These blocks are well accepted by all the types of the animals. Feed block supplementation in all most all types of animals, increased feed and water intakes, corrected rumination and pica, and showed increase in wool yield in sheep, milk yield in lactating cattle, buffaloes, goats and in sheep also. Digestibility trial conducted in Rathi cattle showed higher feed and water intake and better feed utilization efficiency.

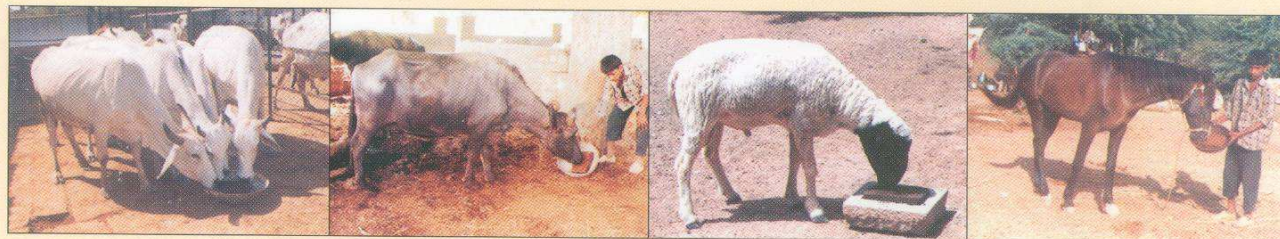


Fig.1 : Livestock Licking MNB Blocks

Table 1. Principal and Alternative Ingredients of Multi-nutrient Feed Block

S. No.	Principal constituent	Alternate constituent (s)
1.	Sugar cane molasses	Sugar beet molasses/ cattle feed grade <i>jaggery</i> / maize strip liquor (maize starch industry by-product)
2.	Urea	-
3.	Common salt	-
4.	Dolomite	Calcite/low silica, dried marble slurry
5.	Mineral mixture containing, amino acids and vitamins (A,D,E)	Mineral mixture containing vitamin A/Mineral mixture containing calcium and phosphorus
6.	Wheat bran	Rice polishings and/or deoiled rice bran, Pearl barley by-products/Malt sprouts/Dried <i>Neem</i> or <i>Ardu</i> leaves, seed free powdered <i>Prosopis juliflora</i> or <i>Acacia tortilis</i> pods/ ground <i>dhaman</i> grass, <i>bajra</i> grain husk and rice polishing mixture/maize gluten feed
7.	De-oiled soyabean meal	<i>Guar</i> meal: <i>korma</i> or <i>churi</i> /any cake of oil bearing seed/ Cotton seed whole, ground
8.	Organic binder ( <i>guar</i> gum dust)	1. Organic: Fenugric seeds, ground 2. Inorganic: Cement, Magnesium oxide, Bentonite or sodium bentonate/ Gypsum/Calcium oxide

Nitrogen balance in block supplementation was improved appreciably. The lambs and kids of block supplemented mothers recorded higher live weight. An off campus trial conducted under NATPS, TAR programme in which the block was supplemented to the farmer's livestock. As per the farmers' view the feed blocks formulated and produced at CAZRI were well accepted by the livestock. Feed block supplementation, increased feed and water intake. It corrected the craving of animals for unwanted materials (including geophagia) caused by the pica. Farmers' noticed that the block feeding corrected rumination, and there was an increase in the daily milk yield by 20-25%. It became discernible from 5-6th-10th day of introduction of the block. 1, 2-kg block, in case of a cattle and buffalo lasted for 7 and 5 days, respectively. The farmers of Kalyanpur village reported that block introduction in buffalo increased daily milk yield by 1 lit over its initial production of 3.5 to 4.0 lit/day. In case of a buffalo, an increase in 1.5 lit/day had been recorded. The blocks were also distributed to the farmers of Kutchch region, even a few urea-free blocks, prepared for horses were also distributed. Both were well accepted by the animals. Presently, 2-kg feed blocks are marketed through institute ATIC out let at Jodhpur.

Establishment of feed block production unit at farmers' level was found to be economic proposition. The initial cost of establishment of village level production of 20 blocks/day, including cost of feed ingredients required for production of 100 blocks (Rs.1453/-), essential gadgets and drying oven, comes to Rs. 40,000/-. It excluded the cost of land and infrastructures. The production can be initiated in ventilated, asbestos shade of approx 70'x20', in which 2, 15'x20' spaces, situated at each end of the shade, can be used for storing the ingredients and finished blocks, and a central space of approx., 40'x20', provided with three phase electric connection for ingredient mixer, block press and draught type electric oven can work as production space. The cost of production of 100 blocks using feed grade jaggery



Fig. 2 : CAZRI'S Feed Block Production Technology

(J) and sugar cane molasses (SCM) comes to Rs. 1460/- and Rs. 1310/-, respectively. Assuming a person can daily produce 20 blocks and if working days in a year are considered to be 300 days, the annual profit on production of (20x30=600 blocks comes to Rs. 32,400 (Rs. 2700/-) and Rs. 41,400/- (Rs. 3450/- per month) if J and SCM, respectively, are used for block production.

H.C. Bohra, A.K. Patel, B.K. Mathur and P.P. Rohilla

## WORLD ENVIRONMENT DAY, 2009

The ENVIS Centre at CAZRI celebrated the World Environment Day on 5th June. An essay competition for High School children was organised on themes "Climate Change and its Impact on Environment" and "Unite to Combat Climate Change". On this occasion two best essays by Mahavir Singh and Shinju Sathyadava were awarded. Most of the participants felt that these types of essay competition increased the awareness towards the environment protection. Hon'ble Justice Rajesh

Balia, Former Chief Justice, Patna High court agreed to grace the occasion. He also delivered a lecture on "Balancing Human Survival and Pace of Economic Development". Dr. K.P.R. Vittal, Director, CAZRI, presided over the function. Dr. Raj Singh, Principal Scientist welcomed the guests and briefed about ENVIS activities at CAZRI. Shri Tirth Das, ENVIS Coordinator proposed the Vote of thanks.

## WORLD DAY TO COMBAT DESERTIFICATION, 2009

The Centre celebrated the World Day To Combat Desertification on 17th June. Organised an invited lecture, followed by a group discussion, wherein more than 40 scientists and other officers from CAZRI were participated. The speaker was Prof. Sunil Sharma, Department of Environment

Engineering, MBM College, Jodhpur. Dr. K.P.R. Vittal, Director, CAZRI, presided over the function. Dr. Uday Burman, Chairman LAC, welcomed the Chief Guests and participants. Shri Tirth Das, ENVIS Coordinator proposed the Vote of thanks.

## Forthcoming Conferences and Events

FAO Conference (36th Session). 14-21 November 2009 at Rome, Italy **Contact:** Mekouar@fao.org and <http://www.fao.org/events/>  
Second Workshop on Productive and Sustainable Use of Saline Waters and Salt-affected Soils in Agriculture, 15-18 November 2009 at Aleppo, Syria **Contact:** [http://www.icarda.org/Announcement/2009/Int\\_Workshop\\_on\\_Saline\\_Water/Int\\_Workshop\\_on\\_Saline\\_Water\\_2009.htm](http://www.icarda.org/Announcement/2009/Int_Workshop_on_Saline_Water/Int_Workshop_on_Saline_Water_2009.htm)

International Conference on Nurturing Arid Zones for People and the Environment: Issues and Agenda for the 21st Century. 24-28 November 2009 at Jodhpur, CAZRI Campus. **Contact:** <http://www.cazri.res.in/azconf2009> and <http://www.azconf2009.org>

ECOSA International Seed Trade Conference. 2-4 December 2009 at Antalya, Turkey. **Contact:** [www.ecosaseed.org](http://www.ecosaseed.org)

15th Conference of the Parties to the UNFCCC and Fifth Meeting of the Parties to the Kyoto Protocol. 7-18 December

2009, at Copenhagen, Denmark **Contact:** Website:[http://unfccc.int/meetings/unfccc\\_calendar/items/2655.php?year=2009](http://unfccc.int/meetings/unfccc_calendar/items/2655.php?year=2009), <http://www.cop15.dk/en>

International Conference on Food Security And Climate Change In Dry Areas, 1-4 February 2010. at Amman, Jordan. **Contact:** [http://www.icarda.org/Announcement/2009/IntlConfnc\\_Food\\_Security/FoodSecurityAndClimateChangeInDryAreas\\_2009.htm](http://www.icarda.org/Announcement/2009/IntlConfnc_Food_Security/FoodSecurityAndClimateChangeInDryAreas_2009.htm)

5th International Food Legumes Research Conference (IFLRC V) and 7th European Conference on Grain Legumes (ECGL VII). 26 to 30 April 2010, at Antalya, Turkey. **Contact:** <http://www.iflrc-ecgl.org/>

The 23d World Congress of the International Union of Forest Research Organisations 'Forests for the Future: Sustaining Society and the Environment'. 23-28 August 2010 at Seoul, Republic of Korea. **Contact:** <http://www.cifor.cgiar.org/Events/CIFOR/iufro-congress.htm>

## CHAUDHARY DEVI LAL OUTSTANDING ALL-INDIA CO-ORDINATED RESEARCH PROJECT AWARD 2008

CHAUDHARY DEVI LAL Outstanding All-India Co-ordinated Research Project Award 2008 was bestowed upon the All-India Co-ordinated Research Project on Arid Legumes, CAZRI, Jodhpur, for its stupendous role in developing profitable and implementable technologies for arid legumes.

During the past 10 years, the project developed 11 varieties of guar, 8 of moth-bean, 6 of cowpea and 8 of horsegram. These varieties gave 20-30% higher grain yield and matured earlier than checks.

The project has developed need-based production and protection technologies for subsistence and corporate farming. The results in farmers' fields have indicated that grain yields of guar and moth-bean can be 2,00-2,200 kg/ha and 1,200-1,400 kg/ha, respectively, with full package under rainfed conditions.

Development of high-yielding and early-maturing varieties of guar with improved gum content and high viscosity of gum has led to consistent increase in guar-gum and subsequent monetary gains.



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