

The molasses block technology in Mauritius and the african perspective

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Summary

The development of the molasses block technology in Mauritius has dealt up, to now, with block formulation and testing of blocks to determine daily intake. The next phase will have to deal with large scale manufacture, animal performance evaluation and marketing. The technology is being used in a number of African countries and results indicate that the molasses block technology is not a simple case of direct technology transfer; it has to bear with country and intra-country specificities. If the technology is to be further developed and gain wider acceptance among farmers, technical, marketing and financial support will have to continue for a further period and international aid institutions will have to play a key role.

KEY WORDS: Molasses block technology, problems, systems

Introduction

Solidifying molasses for use in livestock feeding has been used since a long time. However the process was dependent on heating and dehydration (Paturau 1982); being costly, the use of molasses blocks was limited. In the early eighties, there has been renewed interest in molasses blocks and the development of the cold process has brought the technology within the reach of many countries because of its simplicity and the easy manufacturing process involved (Sansoucy 1986; Sansoucy et al 1986).

Information about the molasses block (MB) technology was brought to Mauritius early in 1985 from NDDDB, India, following a visit by the author. The first trial to manufacture MB was started by the Animal Production Division of the Ministry of Agriculture, Fisheries and Natural Resources in early 1986. This paper reviews the work done during the period 1986-1988.

It is generally felt that the molasses block technology is a case of simple and direct technology transfer. However, results from the development and adaptation of the technology in Mauritius and elsewhere seem to indicate that a number of problems still remain to be tackled and solved.

The first section of this paper deals with the development of the molasses block technology in Mauritius.

The use of slaked lime caused mixing problems as the mix would become very sticky and could not be poured. This problem was solved by using a solution which retarded setting (plasticizer). "reggs mortar mix" was used at the rate of 0.5 to 1.0% (Vol/wt) (Chan, personal communication). The mixing could have been made easier by adding some water, but this option was not tried.

Formulations retained and chemical composition

Of the many formulations tried, two were retained in 1988 (Table 1). Subsequently, only formulation 2 was used.

Table 1: Formulations retained in 1988

Ingredient	Formulation 1 (%)	Formulation 2 (%)
Molasses	50	50
Urea	9	9
Salt	5	5
Slaked lime	15	-
Cement	-	14
Wheat Brans	21	22

The chemical composition of the 2 formulations is shown in Table 2.

Table 2: Chemical composition of formulations (on fresh basis)

	Formulation	
	1	2
DM (%)	77.4	74.7
CP (%)	29.2	28.5
Ash (%)	25.8	24.5
Ca (%)	6.5	6.0
P2O5 (%)	0.53	0.49

Manufacture

Manufacture of molasses blocks has been only done on a small scale to obtain appropriate formulations and blocks for testing. Manufacture of blocks for sale to farmers will be in the next phase of the technology development.

Mixing

The respective amounts of ingredients were weighed to make 20 kg of blocks. The molasses was placed in a wheel barrow. The following ingredients were then added successively with continuous mixing: molasses, urea, salt and slaked lime. Then wheat bran was added and the mixture was made homogeneous by thorough mixing with a spade.

When cement was used as binder, it was made into a paste with water (the water being 35% of the weight of cement), prior to adding it to the wheel barrow.

Casting and Moulds

The 20 kg of mixture was cast into moulds to give 10 blocks of about 2 kg each. Pieces of plastic sheet were used to line the moulds. The moulds were made so as to ensure easy removal of blocks. The size of the blocks was 0.3m x 0.15m x 0.045m.

Drying and Storage

After 24 hrs, the blocks were removed from the moulds and placed on racks to dry for 5 days. During the rainy period, although the blocks dried up, mould growth was apparent. The following were identified: *Aspergillus*, Yeast and *Syncephalastrum spp.*

The manufacturing site will have to be inspectionated when large scale manufacture is started.

Feeding and consumption of blocks

Feeding

While the formulations were being tested for setting and hardness, they were also fed to animals. When placed in feed troughs, animals had a tendency to move the blocks about and at times to bite off big chunks. This was avoided by placing the blocks in block feeding racks, so that only the top surface of the block was accessible to the animals. In that case, animals licked the blocks.

The earlier phase of the development stressed on obtaining blocks which set well (visually) and which could be transported without consequent breakages. Palatability was also an important issue that was considered.

Consumption of Blocks

Trial 1

A first block of known weight was placed in the rack and block intake was monitored after 7 days. The remainder of the feeding ration consisted of fodder and cottonseed cake (CSC) as supplement.

Formulation	%
Molasses	50
Urea	10
Slaked lime	17
Cotton seed cake	10
Wheat bran	13

Duration of observation = 25 days, November 1987

No of animals = 2 bulls, aged 2 years

Average consumption/animal/day = 80 g (range: 55-125 g)

The blocks with this formulation were quite hard and had a

distinctive pungent smell.

Trial 2

The level of lime was decreased to 15%.

Formulation	%
Molasses	50
Urea	9
Salt	5
Slaked lime	15
Wheat Brans	21

Duration of observation = 33 days, February 1988

The details of the trial and consumption data are shown in Table 3.

Table 3: Trial specification and average consumption of molasses block

	Group 1	Group 2
No of animals	3	3
Average final weight, kg	262	233
Basal diet		
Fodder, ad lib	+	+
1.5 kg/d CSC	+	+
Molasses & urea, 1.5% LWt (urea at 2.5% of molasses)	+	-
Molasses Block	+	+
No. of blocks used	13	28
Wt of blocks consumed (kg)	26.5	56.5
Average consumption (g/head/d)	278	571

Trial 3

Consumption of the molasses block (formulation 2) was monitored from April to August 1988 for the two groups of animals - group 1 and 2 had 3 and 4 animals respectively.

The diet contained fodder, cotton seed cake, urea-molasses (2.5% of urea), a mineral mixture and molasses blocks. However, it was not possible to maintain standard conditions due to changes in and disruption of fodder supply and time of feeding among other factors. What is interesting is that the intake of molasses block was quite high (Table 4).

Table 4: Molasses block intake (g/head/d)

Group	Period	Feed	Intake (g/d)
1	Before 24/06/88	UM+CSC+MM+B+F	500
1	After 24/06/88	MM+B+F	1034

Note: UM - urea-molasses, CSC - cotton seed cake
MM - Mineral mix, B - molasses block, F - Fodder

The removal of urea-molasses and cotton seed cake from the ration of group 1 caused the intake of molasses block to double, with a peak of 1246 g/head/d.

The trials mentioned above were very simple. However, they have helped to attain the main objective of this phase of the technology development -- to obtain a formulation which could give an average daily intake of 500-600 g/animal.

Cost of blocks and animal performance

The third trial mentioned above was intended to test the value of the molasses block for fattening, with replication over time. However, experimental conditions could not be maintained rigorously. Thus, the effect of the molasses blocks for livestock production under Mauritian conditions has not been tested effectively yet.

In August 1988, the ingredients for manufacturing the blocks cost Mauritian Rupees 1.69 (US\$0.11) per kg of block. Assuming other costs to be 35% of the ingredient cost, 1 kg of block would cost Rs 2.28 (US \$0.15). With an average daily intake of 500 g per animal, the cost of the block is the equivalent of 0.228 litres of milk (at Rs 5/litre) or 46 g of liveweight gain (Rs 25.00/kg liveweight).

Even though relatively small increases in milk production and liveweight gain would offset the cost of molasses block feeding, the effectiveness of molasses blocks still has to be demonstrated in farm-based trials.

In Mauritius, fodder supply does not become as acute as in mainland Africa. Except under severe drought conditions, mixed fodder is available from November/December to June and after that sugar cane tops are available during the sugar cane harvest season. Therefore, the value of the molasses block technology will be in enhancing animal performance. However, in Rodrigues, an island within the state of Mauritius, molasses blocks may play a crucial role in saving livestock during severe droughts which occur every few years.

On farm demonstration

In March 1987, on the assumption that the molasses block technology was a simple case of technology transfer, molasses blocks were distributed to farmers in a village. Each of 100 farmers obtained 2 blocks of 5 kg each. Subsequently, it was reported that consumption of the block was low. A close follow-up of the block intake with ten cows, in another village, indicated a consumption of about 100 g/head/d. The blocks were also reported to be very hard. The formulation contained the following ingredients (%): Molasses 65, urea 13, mineral mix 5 and slaked lime 17. No further distribution was done.

Current situation

After the third trial, work on the molasses block technology almost stopped at the Animal Production Division due to an acute shortage of technical/scientific staff.

Work has been initiated again in late 1990. New formulations with higher levels of molasses, relative to formulation 2, are being tested. The next phase of research and development will have to deal with large scale manufacture, on-station and on-farm testing of blocks to determine animal production performance and marketing.

Private sector initiative

Livestock Feed Limited, a private feed milling company started testing molasses blocks amongst its clients in 1987. However, this technology has no major role as most of the producers involved have facilities to feed liquid urea-molasses to livestock (Ferriere, personal communication). Therefore, the molasses block technology may only be useful among small-scale producers, since most of them do not have facilities for feeding liquid molasses to their livestock.

The african perspective and a system approach

This section of the paper attempts to synthesize the development of the molasses block technology in the African continent from a system perspective. The system approach is particularly suited to study complex bioeconomic problems (Dent and Blackie 1979) as a piece-meal approach does not allow one to grasp a problem in its total context. Detailed progress and problems have been dealt with by participants in the meetings of the Regional task force on molasses-urea blocks held in 1988 (Burkina Faso) and in 1990 (Niger) and will not be covered here.

Problems

Only the main problems will be considered.

Projects and Funding

As with most projects, there is a tendency among project promoters to believe that their project will be implemented rapidly, results will flow and adoption will be quick. This seems to be an optimistic approach, taking into account the complex environment in which a project has to operate.

The molasses block technology involves the manufacture and sale of blocks among other activities. For such a project to be sustainable, there needs to be a rapid recovery of credit, for the purchase of inputs and continuation of manufacturing activities.

For most projects implemented, it has been reported that problems are faced regarding working capital. In many cases, the situation is aggravated by government financial procedures whereby expenditure and revenue are separate items, so that revenue obtained within a project cannot be ploughed back or used in the project. This calls for a review of the situation and consideration must be given to a different approach, whereby projects such as molasses block technology are given a special status so that the project can retain revenue obtained from the sale of project produce.

Once the funds from funding organisations are exhausted, projects may not continue smoothly because the need to allocate funds in the recurrent budget may not have been recognised and/or implemented, for a variety of reasons. This prevents the smooth continuation of a project.

Staff Availability and Mobility

In Mauritius, the molasses block component of the UNDP project was started with a serious shortage of technical/scientific staff; this was considered alarming by the consultants to the UNDP Project. Where staff is available, there may be a problem of mobility, whereby people working in a project are promoted or moved to other projects or sections/departments within the organisation/Ministry concerned.

Whenever training components are available in projects, or where projects give rise to opportunities for training, the personnel within the project may be envied by other staff and problems may arise. Though there may be specific examples, they are not officially reported for obvious reasons.

Insertion of the Project in the Local Livestock Development Programme

There is a need for the correct insertion of a new project within the local livestock development programme. For example, the evaluation of the effect of molasses block feeding on animal production needs to be carried out in on-farm trials. Unless all aspects of the project (manufacture, testing, distribution and marketing) are covered by a specially assigned team, the project may have to rely on research stations/institutes or other organisations for the implementation of various components of the project. The latter organisations may not consider this particular aspect as a priority for their organisation, as a defined programme of work may already be underway, with all the problems of shortage of funds.

Therefore, proper communication among the various organisations concerned with the various components of the project should be developed and maintained and a commitment to the project undertaken.

A system model

The development of the molasses block technology within a country can be viewed as a subsystem of a wider animal production system. The relatively small size of the subsystem, in terms of value, may be a serious limitation to the recognition required for any project to make satisfactory progress.

The technology involves various activities which have, as end result, the satisfaction of the farmer (consumer).

Six main activities can be identified (Figure 1):

- (1) Identification and selection of ingredients and formulation of blocks
- (2) Manufacture of blocks
- (3) Marketing - distribution, demonstration and promotion of molasses blocks in the animal production system
- (4) Evaluation of animal production performance with molasses block feeding, for various classes of livestock
- (5) Study of farm management aspects (on farm production system) and farmer/animal interaction

The molasses block technology has made appreciable progress in the African continent over the past few years. However, a number of problems will have to be tackled and solved, if the technology is to be adopted on a sustained basis (Mbaye 1990; Badolo 1990). The technology can be viewed as an appropriate technology along the lines defined by Dunn (1989), but it is not a simple case of technology transfer as indicated by the complexity of the problems being faced. The technology needs refinement and project management will have to objectively consider planning, implementation and control functions so that the management loop is effective.

The transition from foreign sponsorship to local funding will have to be implemented smoothly, otherwise disruptions will occur over time and affect project outputs. However, it has to be recognised that many projects may need to be supported by institutions like the FAO, UNDP and organisations financing self-help projects (eg: USAID, DANIDA), because projects need an initial stage of support before they can become self-financing or completely supported locally. The findings of the workshops of 1988 (Burkina Faso) and 1990 (Niger) seem to indicate that the span of time of about 5 years during which projects have been implemented in Africa cannot be considered as an adequate initial stage. Support may have to continue for another 2 or 3 years so that projects can become self- sustaining.

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