Cow-Dung as Manure

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ALTHOUGH agricultural economics in India is often dubbed as 'cow-dung economies', not much *seems* to be known even about cow-dung. There is far too little precise knowledge, for instance, about (he proportion of dung used as fuel, the geographical factors influencing this proportion and the regional variation both in respect of the dimensions of the problem as well as its implications for policy. In discussions on investment criteria, the question of the development of manurial resources in lieu of chemical fertilisers is not even considered; perhaps it is not regarded as sufficiently important to deserve serious study.

NINE MILLION TONS OF FOODGRAINS

What are the basic; facts? It is estimated that manure mostly from cattle amount to more than 800 million tons annually; of this, 300 million tons are used in dry state as fuel and about 160 million tons or 20 per cent are wasted on hill sides and roads. The economic implication of using dung as fuel in rural areas is highlighted by the following estimate : if the 300 million tons of dung could be diverted to manuring, about nine million additional tons of grains could be produced. The question therefore arises, why is it that not much head* way is made in the use of dung as manure?

Attention to this potentiality was drawn as far back as 1893 by Dr Voelcker in his report on Indian agriculture. The Royal Commission on Agriculture reiterated the need for diversion in 1928. It would not he very far from truth to say that it's two-page discussion on farm yard manure and composts remains as relevant today as it was when the Report was prepared. If it has not been possible to make any perceptible progress in diverting the use of dung from fuel to manure, it is because the question posed by Dr Voelcker remains largely unanswered even today : "Of what use will it be to demonstrate at experimental farms the value of manure and how to preserve it when the cultivator has to burn it because he has nothing else to use for fuel?*'

Before we pass on to the question of alternative fuel, it is necessary to underline the regional or local character of dung-use. This is important not merely for understanding the situation in the specific context of a region but also for devising policy measures, say, for providing alternative fuel. The estimate of dung used as fuel, for the country as a whole, may at best indicate the broad dimensions of the problem. But no more. From the policy point of view, it Mould be necessary to undertake detailed studies on regional basis. As illustrative of this need the following facts may he relevant.

REGIONAL VARIATIONS

The distribution of livestock is not uniform throughout the country. If the number of cattle per 100 acres of cultivated area is as high as 130 in Madras Slate, it is only *29* in Bombay Slate. Taking the country as a whole, it is the largest in Madras, followed by West Bengal and Bihar. In U P the concentration of livestock is less than half and in Bombay it is only one-fourth of that in Madras.

Then again, evacuation per animal and the proportion of dung used as fuel seem to vary from region to region. How regional conditions powerfully influence them may be exemplified by the findings of an intensive investigation conducted recently in what was formerly known as Bombay Karnatak region. For purposes of the enquiry this small region was divided into four geographical 11acts, namely, dry. wet, transitional and coastal. It was found that in the region as a whole about 20 per rent of the dung was burnt as fuel. But note the remarkable variations amongst the trails. While in the wet tract this proportion was as high as 37. in the coastal tract the proportion was only 12.

This goes to show that the use of dung as fuel is governed by the availability of alternative fuel materials like not only firewood but also fodder refuse, cotton stalks or dry stubbles, etc. In the wet tract there is not much firewood to he had: and because paddy is the main crop there is not even considerable fodder refuse. As the coastal tract bus a large forest area, the farmers do not find it difficult to secure firewood at negligible cost. On the other band, the quaulitv of manure is higher in the wet than in the dry and the coastal tracts, though the total number of animals here is smaller. This is because of the comparatively higher evacuation per animal.

COW-DUNG VERSUS FERTILISERS

Now to turn to the problem of using dung as manure. The Indian Agricultural Institute has designed a simple village model of a cow-dung gas plant. The dung is, iti lhe first instance, fermented so as to yield a sufficient quantity of combustible gas which can be used for cooking and lighting purposes by the farmer. The residue is still available for use as manure without any loss of manurial content. The cost of a plant, sufficient for a family of five, comes to about Rs 350. No other expenditure on day to-day maintenance is required. A daily production of 100 cubic feet of gas is obtained by the regular addition of the dung of 4 animals.

This seems to be aa ideal gadget: it supplies fuel from dung without destroying its manurial content, lis price, however, is rather high. RH 350 is a sum much beyond the resources of the average farmer. To expect him to invest this amount to get what was hitherto available to him almost free of charge is hardly realistic. It would be more practicable, therefore, for the State to set up bigger gas plants, one for every village. The dung of the entire village should be collected and utilised in these plants from which has will be supplied to all the residents in the. village for domestic fuel and lighting. The farmer will not be called upon to invest any amount on such plants, the gas would be supplied in exchange for the dung he contributes to the plant. Village sweepings, leaves and other decomposed vegetable matter all of which might otherwise be wasted. could also be profitably utilised on such plants.

RELATIVE COSTS

To set up such plants in all the villages in the country, how large would the investment he? Secondly, given the investment allocation for the production of nitrogen, which of the alternative technical possibilities is to be preferred chemical fertiliser factory's or cow-dung gas plants?

Although precise data regarding the cost of such village gas plants are not available, the order of outlay needed could nonetheless be estimated. The cost of such gas plants does not vary directly with size. For ins tuner., a plant about ten times bigger than the 'family plant' designed by the Agricultural Institute is estimated to cost about lis 1000. Assuming that the bigger plant would utilise the dung of ahout 50 cattle, the aggregate, cost for erecting gas plants to use the dung of 155 million cattle in the country (figure for 1951) would work out to Rs 310 crores.

The 300 million tons of dung would yield 900.000 tops of nitrogen 4 which is equivalent to 1.5 million tons of ammonium sulphate). The annual rated capacity of Sindri is ahout 75,000 tons of nitrogen. To produce 900,000 tons of nitrogen, therefore. 12 factories each of the size of Sindri will have to he set up. Since fixed investment on Sindri is ahout Rs 25 crores, the total fixed investment alone on the 12 factories would he of the order of Rs 300 crores.

Thus with more or less the same investment it seems possible to produce an equal quantity of nitrogen from dung gas plants. There is also a big difference which lilts the scales in favour of gas plants. The decidedly additional advantage of gas plants is the domestic fuel which they can supply to rural areas. It is hazardous to estimate the value of the fuel in monetary terms. As a broad indicator, however, the following data are significant. At present the 60 million rural households, it is estimated, burn dung equivalent to 35 million lons of coal. If the same quantity of fuel is provided by the gas plants in fact it may he more the resulting benefit could be valued at about Rs 210 crores.

These data and the calculations are admittedly rough estimates but they suggest the greater profitability of investing on gas plants.

WITH SAVE FOREIGN EXCHANGE

Nor this all. There, seem to he a number of incidental advantage. The most important in the present context is the saving of foreign exchange that would result of the cow-dung gas plant scheme is adopted. Of the Rs 25 crores of fixed investment on the Sindri factory, the foreign exchange component is Rs 10 crores. Hence for 12 factories of ahout the same size the total foreign exchange requirements would be Rs 120 crores. On the other hand, for creeling cow-dung gas plants, all the- materials and skill can he had from within the country. The time-lag will also he less. It takes ahout three years to set up a fertiliser factory, while the dung plant may be put up and got into operation within, say, a year.

A more pertinent point 's that the cost per ton of nitrogen would he brought down substantially in the case of dung plants. There are at least three factors which go to indicate such reduction. Firstly, the raw-materials used on the dung plant obviously cost very much less than those used in the production of chemical fertilisers. Secondly, since the plants will be spread out through* out the country-side the heavy transport costs now incurred on the distribution of fertilisers will almost tend to disappear. Thirdly, the over-head costs are also likely to be lower in the case of dung plants. The elaborate administrative machinery which becomes necessary in the case of a few factories would not be needed in the case of the dung plants. These economies, may bring down the. cost by more than 30 per cent. It is hardly necessary to add what this would mean to the agricultural economy in general.

Gas and Fertilisers from Agricultural Wastes

TWO pilot plants to produce gas and fertilisers from agricultural wastes are to be set up shortly: the one at the National Sugar Institute, Kanpur. will use bagasse; the other at the Agricultural Research Institute. Delhi, will use cow-dung and other agricultural wastes. The plants will be set up by Chemolimpex, the Foreign Trade Company for Chemical Products of Hungary.

Under an agreement, signed last month, Chemolimpex will furnish Cov eminent with technical data and designs and provide adequate technical staff for installation of hio-gasd'crliliser plants. The number of plants to be set up has not been decided yet. Within six months of the successful working of the two pilot plants. Government will estimate the number likely to be set up by its agencies. Chemolimpex will also be permitted to help private owners in setting up gas plants.

Rupee Payments to Foreign Countries

SINCE an increasing part of our imports is now being paid for in rupees, it would be interesting to know the magnitudes of such payments during the First and Second Plan periods. The figures reproduced below were given recently in Parliament.

These give a breakdown of payments by countries ami their nature. They include rupee payments in lieu of loans received under PL480 and P L 665, instalments of principal and interest payments, and payments for goods purchased under bilateral agreements which allow part payment in rupees.

Payments in rupees to foreign nationals for technical know-how, however, are not included.

(Rupees crores)

	First Plan	Second Plan
U S A		
Development Assistance & D L F Loans	-	4.53 (2.24)
P L 665 and P L 480	4.80	345.12
U S S R		
Bhilai Credit	—	13.64 (2.42)
Payments for Goods	1.40	59.22
Other Countries (for goods purchased under bilateral agreements)		
East Germany	0.27	9.19
China	0.18	7.72
Bulgaria	—	0.34
Yugoslavia	—	3.11
Rumania	—	3.12
Hungary	-	4.22
Czechoslovakia	—	4.76
Poland	-	7.76
Total	6.65	462.73 (4.66)

Figures in brackets indicate payment of interest.