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## CONCLUDING REMARKS

Rather than giving detailed reports on each of the combinations we present here, in some detail, the results for all four technologies for farms of five hectares and some comparisons for the smaller and larger farms (See Table 1).

Although the differences in family incomes for the five hectare farms are not large - \$136 separates the highest from the lowest - they are significant for small farmers. Using income as the standard, mules are the preferred technology for the five hectare farms. For the three size classes the rank order in incomes are as shown in the table below:

TABLE 2. TECHNOLOGIES ORDERED BY INCOMES FOR SIZE CLASSES

	4 Hectares	5 Hectares	8 Hectares
Mules	1	1	2
Small Tractor	2	2	1
Oxen	3	3	4
Large Tractor	4	4	3

On the smallest farms oxen and the small tractor yield virtually the same incomes. On the largest farms limitations on power force the farmer using oxen to resort to less preferred crops and the large tractor is then preferred. It is interesting

to notice that in no case is the large tractor preferred and in no case are oxen preferred.

We now consider the investment per hectare in each of the cases, given the earlier assumptions. Table 3 shows that investment in implements is higher for tractors than for animals whereas the animal technologies require more labour.

TABLE 3. ORIGINAL INVESTMENT PER HECTARE BY TECHNOLOGY AND SIZE OF FARM

	4 Hectares	5 Hectares	8 Hectares
Large Tractor	\$ 1555	\$ 155	\$ 155
Small Tractor	165	130	80
Mules	105	80	50
Oxen	105	80	50

The investment per hectare and cost of the small tractor could be reduced to almost the levels of mules if the excess capacity in the small tractor were utilized by dropping the assumptions about one rig per farm. This will be done in the final version of these models where a major focus will be on investment and cropping patterns by unit. Finally, it is well to conclude by calling attention once more to the assumption that yields are independent of power source. Changing that assumption could alter the results dramatically.

## Discussion Report

Dr. M. Alexander asked what types of enterprise mixes were used and if different coefficients were used for varying farm size.

Dr. Winkleman replied that there were changes in the production mix with changes in farm size and from one crop to another. He also stated that production coefficients were independent of size group. The object of the exercise was to obtain optimum factor utilization.

Mr. Nurse inquired of numbers used in the programming were derived from experimental work.

Dr. Winkleman replied that no experiments were used to obtain the values. This was because

previous work indicated great unreliability of random samples and other statistical sources. It was therefore, necessary to interview the farmer, get information from him, set up a formula (model), go back to the farmer to test it and make modifications until a workable programme was derived.

Mr. Buckmire expressed the view that there was inherent danger in obtaining information from the farmer. His personal experience was that without records, farmers were not in a position to give accurate information and that while some possessed this information it was distorted (magnified or otherwise) when given to other persons. He, therefore, advocated that investigators should have a working knowledge of performance so that information, when given, could be questioned with the hope of getting the correct information.

The question was raised whether there is any great difference existing between the 'milpa' farmer and the type of Mexican farmer in the study. It was

made clear that both were traditional farmers and needed encouragement to enable them to change their way of farming. In addition, training would be vital in getting the farmers trained to use tractors and other factor inputs which they do not at present use.

Interest was expressed in the mini-tractor which was used as a form of power. Its performance, price and other details were given. Dr. Johnson reported that its performance was observed in Jamaica on various soils and from all indications this type of tractor is likely to be successful.