

The small amount of improvement in the phosphate content of the white clover manured with phosphate is a matter which calls for attention. It may be that the grasses are the pasture components which are more extensively altered in their mineral content by manuring, and that the clovers are always of fairly uniform composition in this respect. The matter will be more suitably discussed when the analyses of the cocksfoot samples are considered.

It will be observed that as yet no attempt has been made to lay down definite standards to distinguish contaminated from uncontaminated samples, and the writer considers it unwise to fix such standards until the results of a larger number of samples have been accumulated over more than one season, and, if possible, from a series of soil types and soil provinces. At present each sample is judged on its merits.

The amount of silica will certainly need to be determined separately for the grasses and for the clovers, as there is no doubt that this constituent is taken up in greatly differing amounts under normal conditions by the two families *Gramineæ* and *Leguminosæ*. With regard to alumina, this may also be taken up in very different amounts by these two families. In water cultures McLean and Gilbert (*Soil Science*, Sept., 1927, Vol. 24, p. 163) found that rye-plants absorbed 0.05 per cent. aluminium, which is equivalent to 0.95 per cent. aluminium oxide ( $\text{Al}_2\text{O}_3$ ). This is possibly higher than usual, as the cocksfoots grown in soil (not water), which are considered uncontaminated in these articles, have not a higher alumina content than 0.05 per cent.  $\text{Al}_2\text{O}_3$  approximately. Stoklasa considers that plants in moist places absorb aluminium more freely than do plants ordinarily. This authority found 0.01 per cent.  $\text{Al}_2\text{O}_3$  in the above-ground portion of cocksfoot in dry situations and 0.016 per cent. in wet situations (*Jour. Agric. Science*, Vol. 16, p. 337).

Some work of McCarrison (*Ind. Jour. Med. Research*, No. 14, 1927, p. 641) opens up a new field for investigation. It appears that rats fed on rice and wheat, when an *ad libitum* basal diet was also given, showed differences which were in part attributed to the greater manganese content of the wheat, which contained an amount four times greater than that of the rice. This was tested by adding manganese to the rations. The conclusion appears to be justified that concentrations of manganese of the higher order (1 in 12,600 of food) were harmful to the animal organism, while concentrations of the lower order (1 in 617,700) were beneficial; and since a diet containing a fair proportion of whole wheat provides a concentration of the lower order, it may be concluded that the growth-promoting properties of whole wheat are in part due to the content of manganese in this cereal.\*

There are now several biochemists studying the influence of manganese in the diet on animal-growth, and it affords a most fascinating field for study.

#### COCKSFOOTS.

The great difference in the chemical composition of the ash of grasses compared with clovers is now seen to be the silica content, which is very high in the grasses, and almost absent in the clovers,

\* A possible explanation of the fact that in the feeding of penned fowls wheat cannot be substituted by many other obtainable foods may be the beneficial influence of manganese in the wheat.