VII. THE NUTRITIONAL VALUES OF THE GRAIN SORGHUMS

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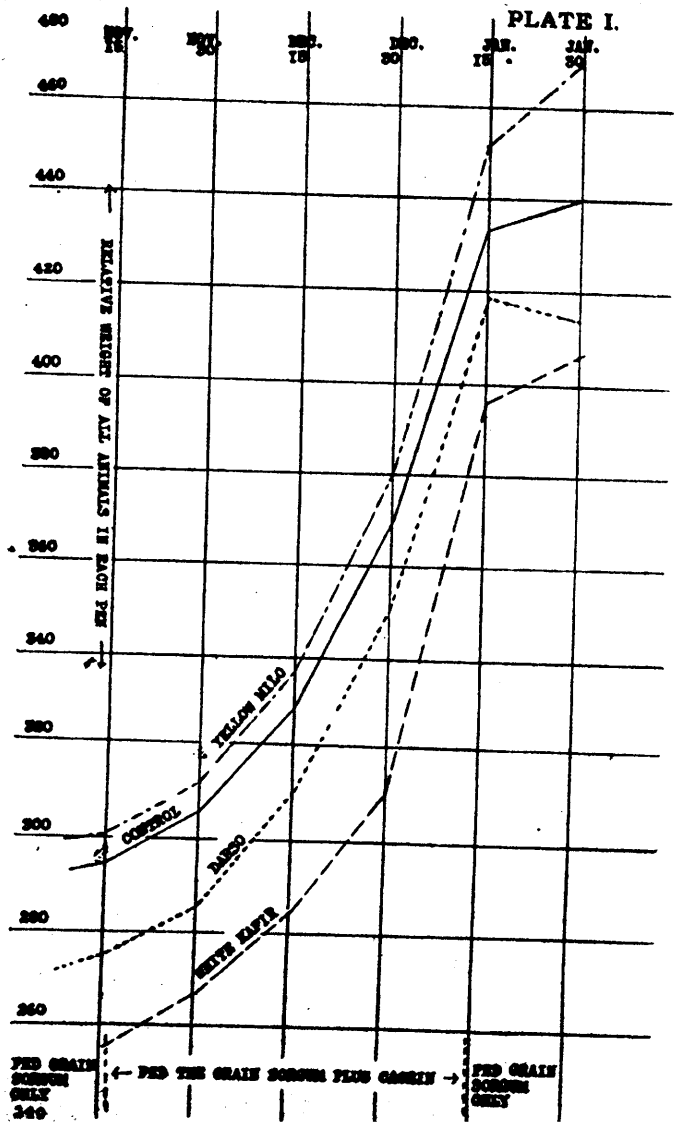
The grain sorghums are adaptable to regions of light and insufficient rainfall and for this reason they are peculiarly adapted to the climate of Oklahoma and form one of its most valuable farm crops. In view of the drouth resisting properties of these grains and their increasing economic importance, it seems desirable to investigate their nutritive value.

Albert G. Hogan of the Kansas Experiment Station found that if animals are fed a diet in which all the protein contained in the diet had been derived from the grain sorghums in all cases such a diet results in nutritional failure. It is well known that different proteins are not equal in their nutritional value. The nutritional value of a protein is dependent upon the proportion of the various amino acids it contains. If a protein is deficient in one or more amino acids and incapable of supporting maintenance and it be supplemented with a small amount of another protein rich in these amino acids, normal growth will ensue. The protein of the kafirs will not support maintenance in animals but if milk or peanuts be added to the diet, normal growth will take place.

The protein of corn is also incapable of supporting life, and must be supplemented with other proteins as is the case with the kafirs. Recently H. Steenbock and P. W. Bontwell found that there was a difference in the nutritional value of the yellow and white corn. When animals were fed a diet composed of ground corn and purified casein (the protein of milk), growth took place at the normal rate if yellow corn had been used in the diet, but nutritional failure resulted if white corn was used. It is concluded that yellow corn contains a dietary constitutient which is necessary for growth, which is lacking in white corn. This is not due to difference in protein, but to the so-called accessory food substnces. If corn varies in nutritional value according to color it is of value

PLATE I.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RELATIVE WEIGHT OF ALL ANIMALS IN EACH PEN
YELLOW MILO
COMBROL
DARSO
WHITE KAFIR
FED GRAIN SORGHUM ONLY
← FED THE GRAIN SORGHUM PLUS GAMBIN →
FED GRAIN SORGHUM ONLY

to know if such is also the case with the grain sorghums. In order to bring out the limitations in the nutritional value of the grain sorghums several groups of young animals were fed on these grains. One pen of animals was fed yellow milo, another pen darso, which is red in color, another pen was fed white kafir, a fourth pen was used for control observations. Each pen received the same kind of grain sorghum throughout the entire experiment. At the beginning of the experiment all animals were fed a diet consisting of only the grain sorghum seed for a period of one month. At the end of this time growth ceased in the animals, i. e., their weight became stationary, this is on account of the fact that as was explained before the protein in the grain sorghums does not support growth. At the end of one month, purified protein from milk was added to the diet of each pen, including the controls, the control pen received other foods such as fresh milk and raw vegetables. The milk protein used was purified in order to eliminate the introduction of any of the so-called vitamines to the diet excepting those contained in the seed of the grain sorghum.

As was explained before the protein of the milk supplements the deficiency of the protein of the grain sorghum.

The diet now consisted of grain sorghum seed 90 per cent milk protein 7 per cent and salt 3 per cent. The animals were fed on this diet for two months and the increase in weight of each pen carefully noted. The increase in weight of each pen is shown graphically in the accompanying chart. It will be noted that the growth in each pen including the control pen is nearly the same. From this we would conclude that the nutritional value of the three types of grain sorghums are equal in value, and that they contain a sufficient quantity of the so-called growth accessory substance. At the end of the second month all the animals were again placed on a diet composed exclusively of the grain sorghums, the same kind of grain sorghum it had received before. A very slight increase in weight, or even a decline was shown for the next fifteen days.

From the results obtained from this experiment we conclude that of the three types of grain sorghums examined, yellow milo, darso, and white kafir, there is no difference in their nutritional value. Darso seems, however, to be slightly distasteful to some animals. The nutritional failure when the diet is composed of grain sorghums only, is due to the protein, which from the standpoint of nutrition is incomplete.