

299. Sulphur and Phosphorus Found Mostly in Protein Foods. In the common foodstuffs on the farm the mineral substances which produce acids in the body are sulphur, phosphorus and chlorine; those which produce bases are potassium, sodium, calcium and magnesium. These are found in various combinations in plants and feeds, but the greater part of the acid-forming substance in the animal body comes from sulphur and phosphorus. The sulphur of feeds is contained almost entirely in the protein or muscle-forming part; phosphorus is contained in a number of forms in feed, but most largely in the protein, also. Thus it will be seen that any feed rich in protein will cause the formation of a large amount of inorganic acid in the animal body. This requires that high protein foods have sufficient base-forming material accompanying them to insure that the acid formed in the animal body will all be neutralized.

302. The Cause of Small Bones. It will be seen from this that the balance between the acid-forming elements and the base-forming elements in the ration for animals is of great importance. This balance is indicated by analysis in the ash of the feeds, which shows the relative proportion of the two classes of elements. Unless sufficient base-forming material is present in foods, the bones themselves will be robbed to supply bases to neutralize the excess of acid. A condition of this kind is the cause of rickets or porous bone in old animals; and of a lack of bone development in young animals where the ash content of the food may be high, but where the acid-forming and base-forming elements are not balanced.

301. Corn Has an Acid Ash. In straight corn-feeding we see the resultant of a complication of deficiencies; corn lacks protein as well as minerals. In the ash, both acids and bases are deficient but the bases considerably more so than the acids, so that as an only food, corn is characterized by an excess of acid mineral elements, and this excess, together with the deficiency in the total amount of mineral matter present, limits the growth of the skeleton; but if the protein in the ration of the corn-fed animal is increased by the use of supplements to such an extent as will support a maximum production of protein increase, then both phosphorus and the mineral bases must be increased.

302. The Quantity of Ash Required. The basic mineral elements in a ration must be present in quantities corresponding to the protein, since the sulphur and phosphorus of the food proteins constitute the chief sources of mineral bases in the food but also that this excess be maintained at a high level; that is, that aside from the balance between acid and base, the total quantity of ash should be considerable.

303. Alfalfa and Clover are very rich not only in protein but also in the mineral bases, so that they make a fine supple-