Common Weeds as a Cause of Perirenal Edema In Swine

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The disease problem described here has been diagnosed with increased frequency in Iowa during the last few years. The literature contains very few references to perirenal edema as a lesion in swine (2, 3), and even fewer references to the condition as a distinct disease syndrome.

During the summer of 1965, the authors investigated 12 reported cases of perirenal edema in swine, and from these investigations drew several conclusions. The common finding in all field cases investigated was consumption of excessive amounts of *Amaranthus spp.*, the common pigweed, (Fig. 1) and frequently *Chenopodium album*, lamb's quarters. Confirmed cases have been reported only in the months of July, August, and September. Almost invariably the affected pigs had been turned from a dry lot onto a pasture containing heavy growth of the above plants. These two factors may furnish a clue to the exact conditions resulting in poisoning by these plants, since very few species of plants are toxic to swine, and most of them are rarely ingested in quantities sufficient to produce disease (2). It may be that only during certain stages of growth are the plants toxic. This, together with the added desire for green forage by feedlot pigs, could be the precipitating factor for production of the disease.

Figure 1—Flowering head of the pigweed plant (*Amaranthus retroflexus*), a species common to Iowa.
CLINICAL SIGNS

As a general rule, the pigs graze a weedy pasture for a period of from 5 to 1. days before clinical manifestations or deaths occur. The clinical signs include weakness, trembling, incoordination in the hindquarters, and knuckling of the pastern joints. This weakness may progress to an attitude of sternal recumbancy, followed by coma and death (Fig. 2). Death usually occurs within 24 hours after the pigs become clinically affected. A high percentage of the pigs that show clinical signs die, and herd morbidity may be 50% or greater.

PATHOLOGICAL CHANGES

The post mortem findings have invariably included a retroperitoneal perirenal edema (Fig. 3). Frequently a perirectal edema and edema of the subcutaneous abdominal fascia is also observed. The edema varies from moderate to very severe, but has been present to some extent in all recognized cases to date. The edematous fluid is usually clear, but may in some cases contain blood (Fig. 4). In addition to the edema, ascites and hydrothorax have been observed. Infrequently, ecchymotic hemorrhages have been seen on the kidneys. The kidneys are usually normal in size and pale with blushed areas, but occasionally are enlarged and congested.

DISCUSSION

The diagnosis of Porcine Perirenal Edema (PPE) has apparently been frequently confused with nightshade (Solanum nigrum) toxicity and with edema disease of swine. Other toxic plants, such as buffalo burr (Solanum rostratum) and Jimson weed (Datura stramonium), have also been incriminated by practicing veterinarians as the cause of the disease. These plants were present in only a few cases of PPE investigated during the summer of 1965, and in no instance was there evidence that they had been eaten by the pigs.

Amaranthus spp. and Chenopodium album have both been found to contain high concentrations of nitrate in certain stages of growth and under certain conditions (1, 3). The blood of affected pigs did not have the chocolate-brown color of methemoglobin, nor were petechial hemorrhages on serosal surfaces observed. Although edema disease does have some lesions in common with PPE, the extreme mesenteric edema, gastric edema, and hemorrhagic characteristics of edema disease have not been consistently observed in PPE. The edema of the perirenal tissue that is characteristic of PPE is rarely seen in edema disease (2).

A preliminary feeding trial with fresh, green pigweed (Amaranthus spp.) was conducted in September, 1965. Six pigs

Figure 2—A pig affected with perirenal edema exhibiting the typical attitude of sternal recumbancy.
Figure 3—Abdominal cavity of a pig from a field case of perirenal edema with extensive edema surrounding both kidneys (arrows).

Figure 4—Abdominal cavity of a pig from a field case of perirenal edema with serosanguineous edema surrounding both kidneys.
that had been raised on concrete and weighed from 40-60 pounds were fed pigweed free choice for 5 days. Two pigs became clinically ill on the 7th and 8th days, respectively, after beginning the feeding experiment. None of the remaining pigs developed objective symptoms, although one appeared listless on days 8 and 9. The affected pigs were euthanatized the day they appeared sick and post mortem examinations were performed. One pig had edema of the perirenal tissue typical of that seen in field cases of PPE. The other pig had no edema, but the kidneys were pale with multiple areas of blushing in the cortex.

A project attempting to further characterize the disease is now in progress at Iowa State University.

**TREATMENT**

Since the exact etiology and pathogenesis of this disease has not been characterized, and the toxic principle remains to be isolated, no treatment has yet been developed for this disease. Immediate removal of the affected pigs from the weed pastures as soon as symptoms are seen is the only definite recommendation that can be made at this time. Turning dry lot pigs into pastures containing a heavy growth of the above plants should be avoided. Pigs raised on the pasture while they are still on the sow have been found to be resistant to the disease. The sudden change from dry lot to the weeds has been a constant finding in the investigated cases to date. After the pigs have been removed from the pasture, death losses may continue for a few days.

**REFERENCES**