



Prevention and treatment of nutritional disorders in swine

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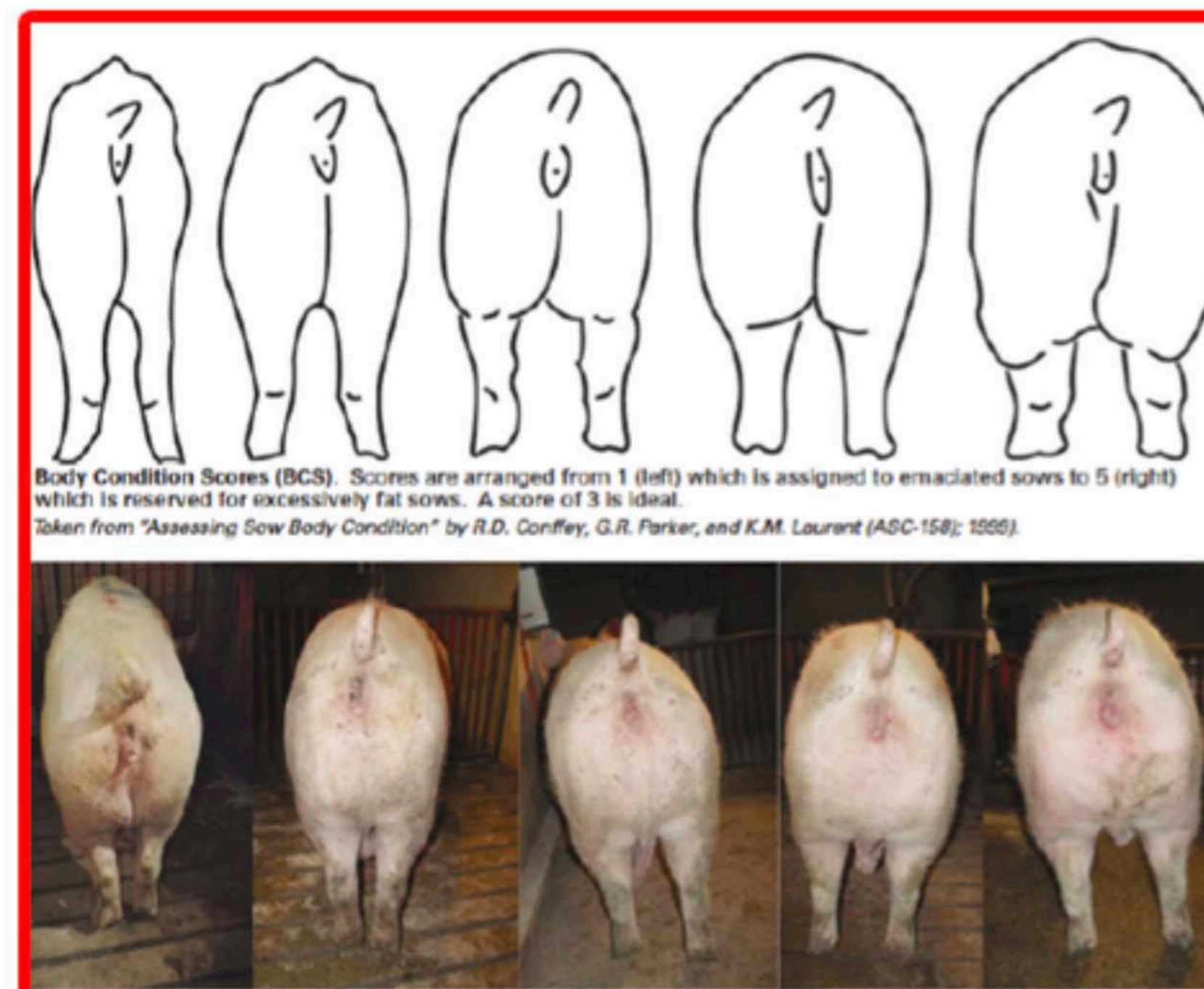
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ENERGY DEFICIENCY

- ▶ **Negative energy balance (NEB) - energy requirements exceed nutrient intake.**
- ▶ **When NEB occurs, the nutrient deficiency is compensated via mobilisation of body reserves of fat and protein.**
- ▶ **This can cause substantial weight and back fat loss as well as reduced reproductive performance.**
- ▶ **Additionally, there is also a substantial knock-on effect on the progeny with piglet weaning weights and vitality often being reduced.**



Body Condition Scores (BCS). Scores are arranged from 1 (left) which is assigned to emaciated sows to 5 (right) which is reserved for excessively fat sows. A score of 3 is ideal.
Taken from "Assessing Sow Body Condition" by R.D. Conifey, G.R. Parker, and K.M. Laurent (ASC-158); 1999).

BCS Score 1 BCS Score 2 BCS Score 3 BCS Score 4 BCS Score 5

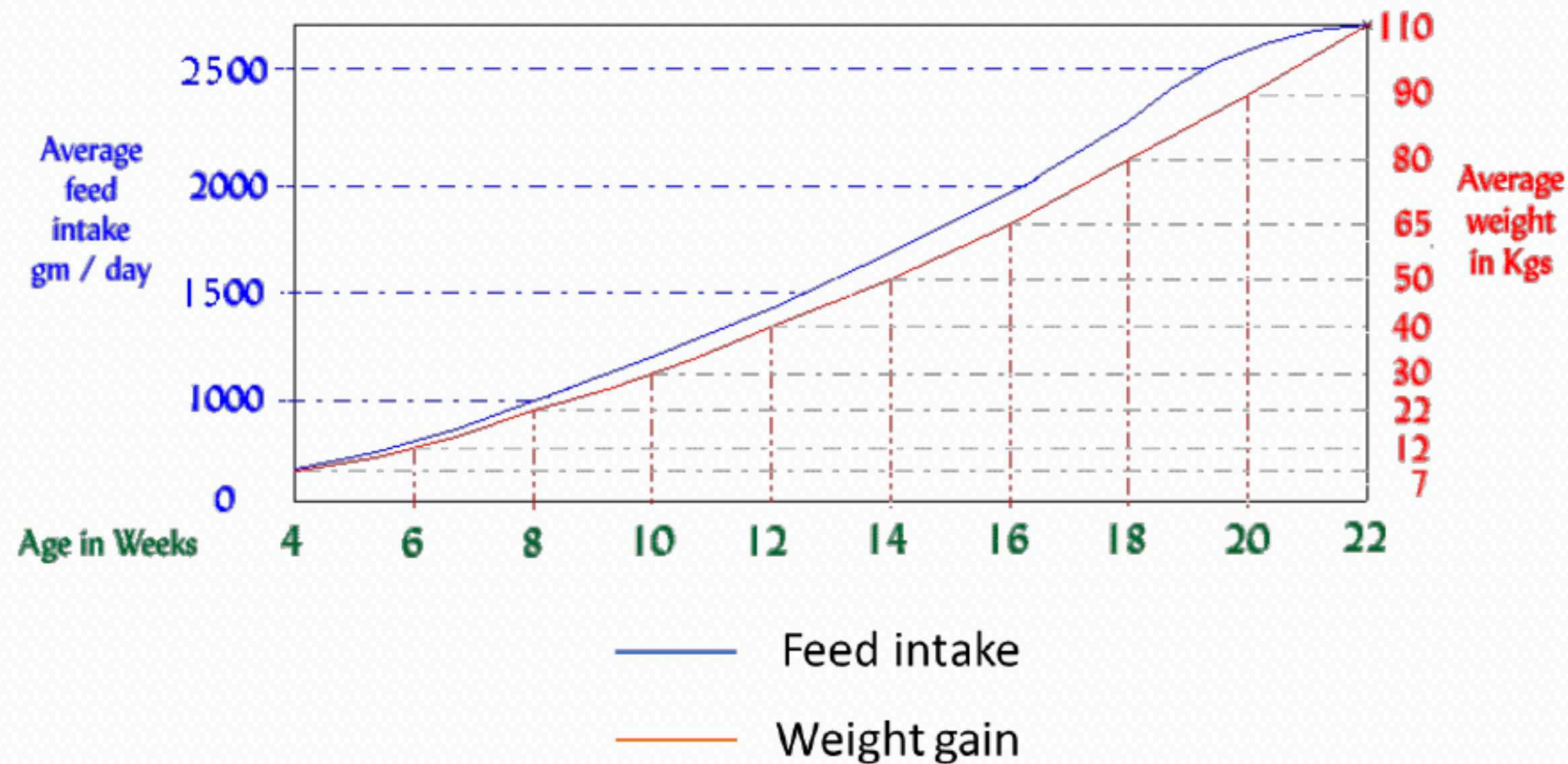
Photo credit: Dr. Ken Stalder and the National Hog Farmer magazine

Score	Last rib backfat depth (in.)	Condition	Body Shape
1	<.6	Emaciated	Hips, spine prominent to the eye
2	.6 - .7	Thin	Hips, spine easily felt without pressure
3	.7 - .8	Ideal	Hips, spine felt only with firm pressure
4	.8 - .9	Fat	Hips, spine cannot be felt
5	>.9	Overfat	Hips, spine heavily covered

Provide high energy ration to Growing / Pregnant / lactating pigs
Inclusion of
Maize – above 40%
Vegetable oils / animal fat – 0.5 to 1.0 %

PROTEIN DEFICIENCY

- ▶ In growing and finishing pigs reduced gains, poor feed conversion, and fatter carcasses.
- ▶ In lactating sows, milk production is reduced, excess weight loss occurs, and sows may fail to exhibit postweaning estrus or have delayed return to estrus.

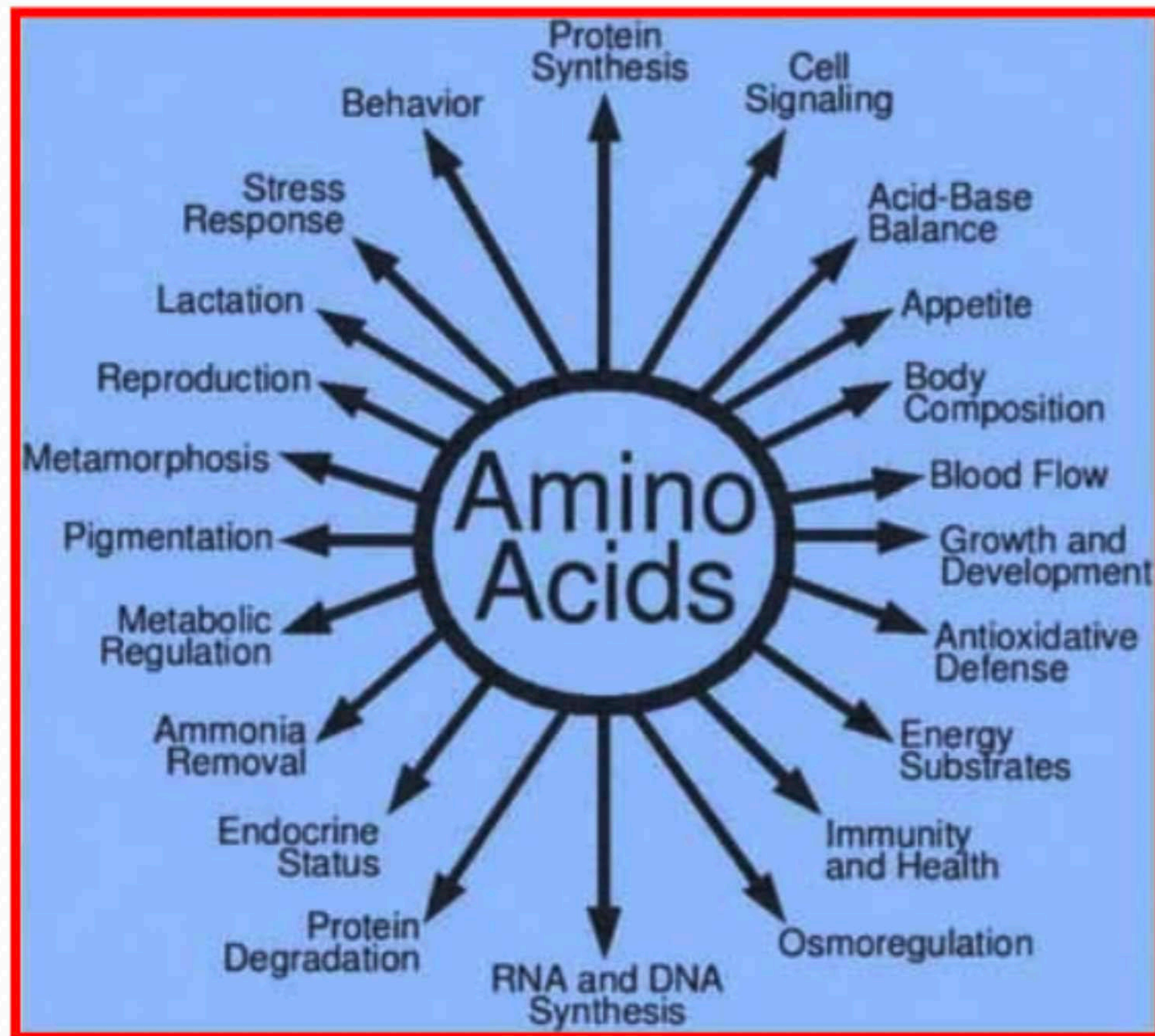


Check protein content of Ration

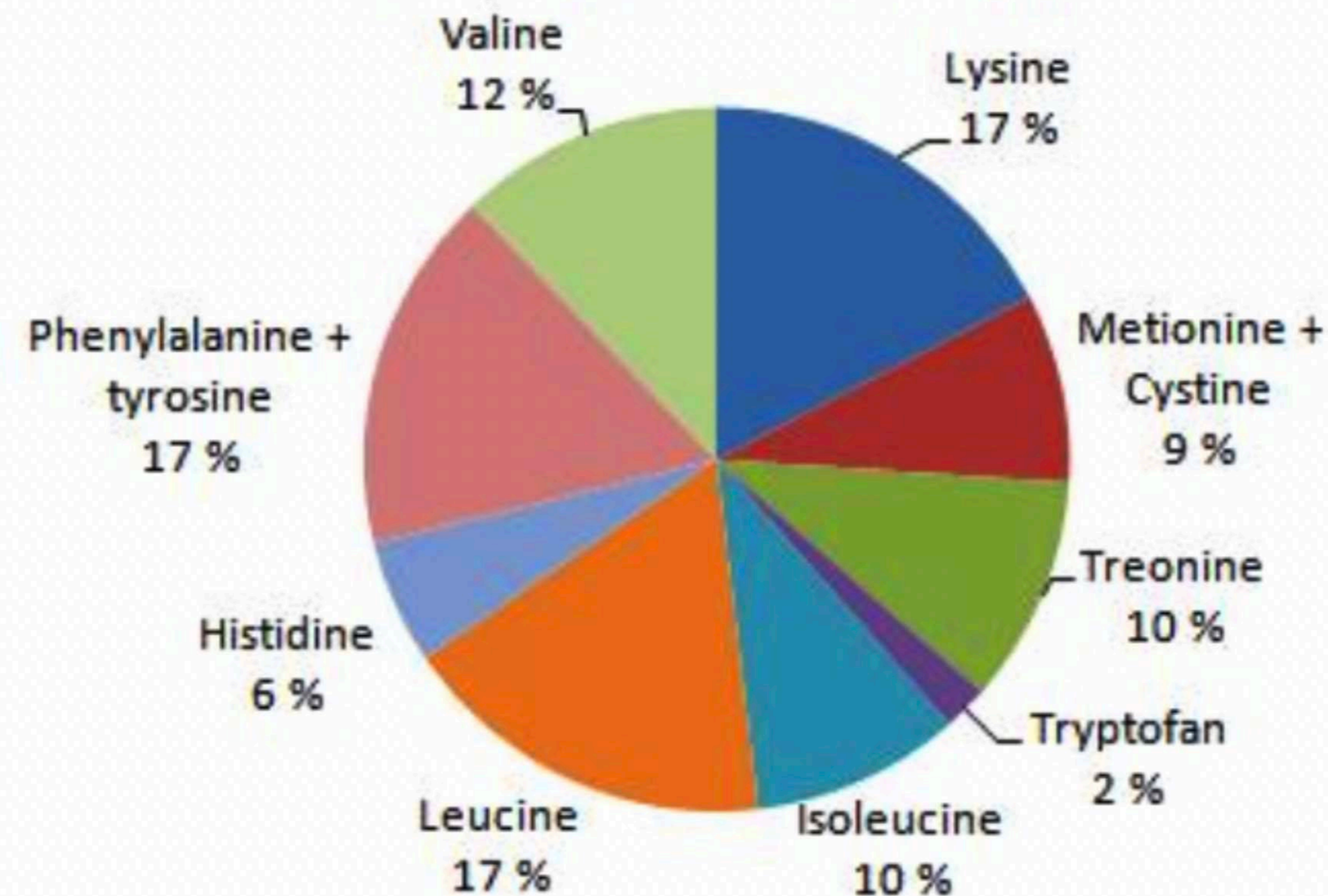
Adjust protein content of ration as per requirement

Include protein supplements of high biological value – Fish meal / Soy bean meal

AMINO ACID DEFICIENCY



Ideal protein for pigs



Supplementation of deficient amino acid in the feed



ESSENTIAL FATTY ACID DEFICIENCY

- ▶ **Linoleic acid deficiency**
- ▶ **Induces hair loss, scaly dermatitis, skin necrosis on the neck and shoulders, and an unthrifty appearance in growing pigs.**

Supplementing corn oil / other vegetable oils in swine ration

CALCIUM OR PHOSPHORUS / VITAMIN D DEFICIENCY

Rickets in growing pigs - Signs include deformity and bending of long bones and lameness. Costochondral junctions are grossly enlarged in a classical rachitic rosary

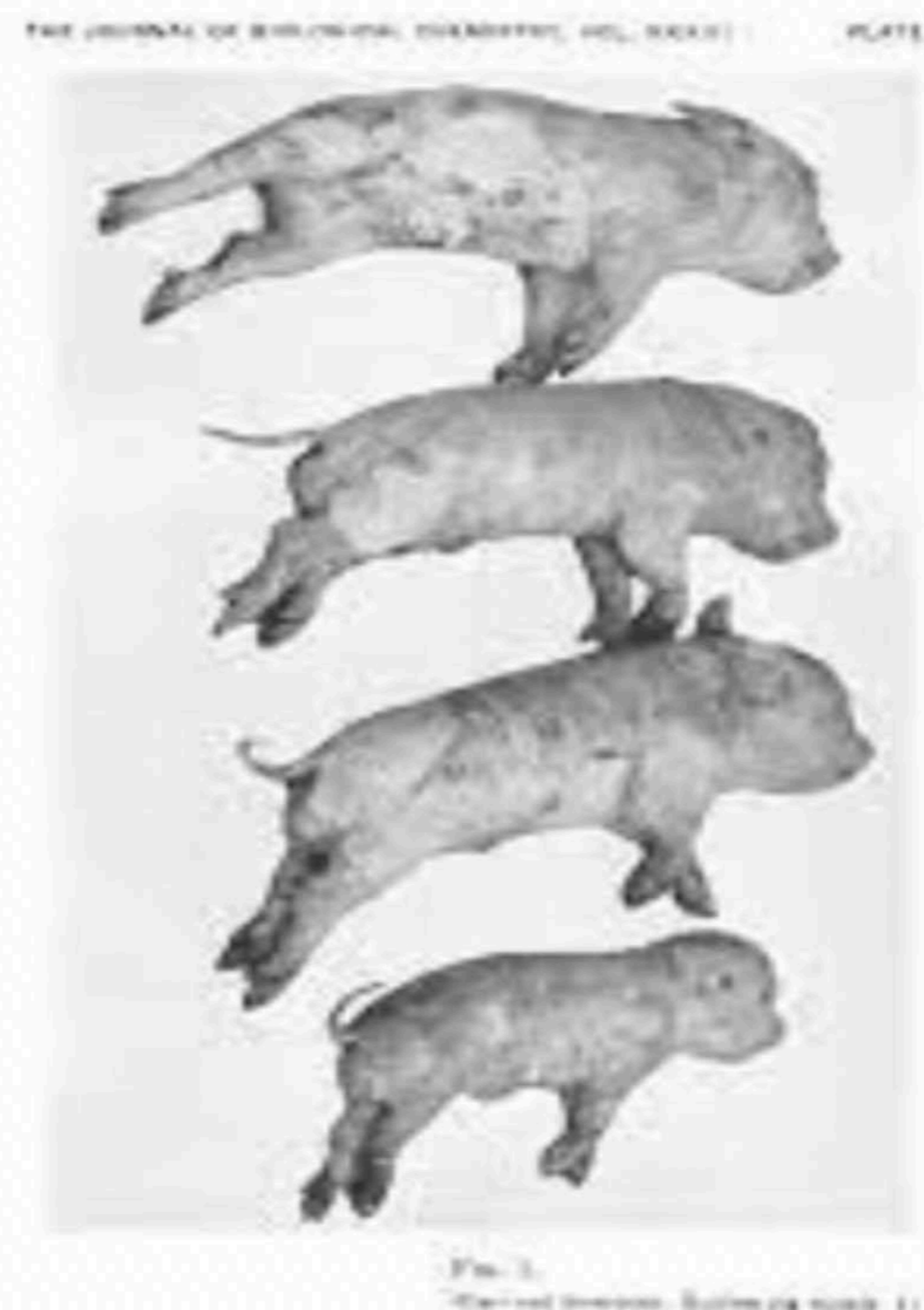
Osteomalacia in mature pigs - Signs include fractures and posterior paralysis toward the end of lactation or after weaning

Supplementing animals with monocalcium or dicalcium phosphate, defluorinated phosphate, and steamed bone meal



IODINE DEFICIENCY

- ▶ In swine, goiter usually occurs in iodine deficient regions where iodized salt has not been included in the dam's feed.
- ▶ Deficiency of iodine leads to the birth of weak or dead pigs that are largely devoid of hair.
- ▶ Many of the pigs have a mucinous edema, especially over enlarged foreparts of the body. The skin in these areas is thick and doughy.
- ▶ The tongue is often edematous and may protrude from the oral cavity.
- ▶ Enlarged thyroid glands (goiter) in piglets may not be visible externally but often can be palpated or observed at necropsy.

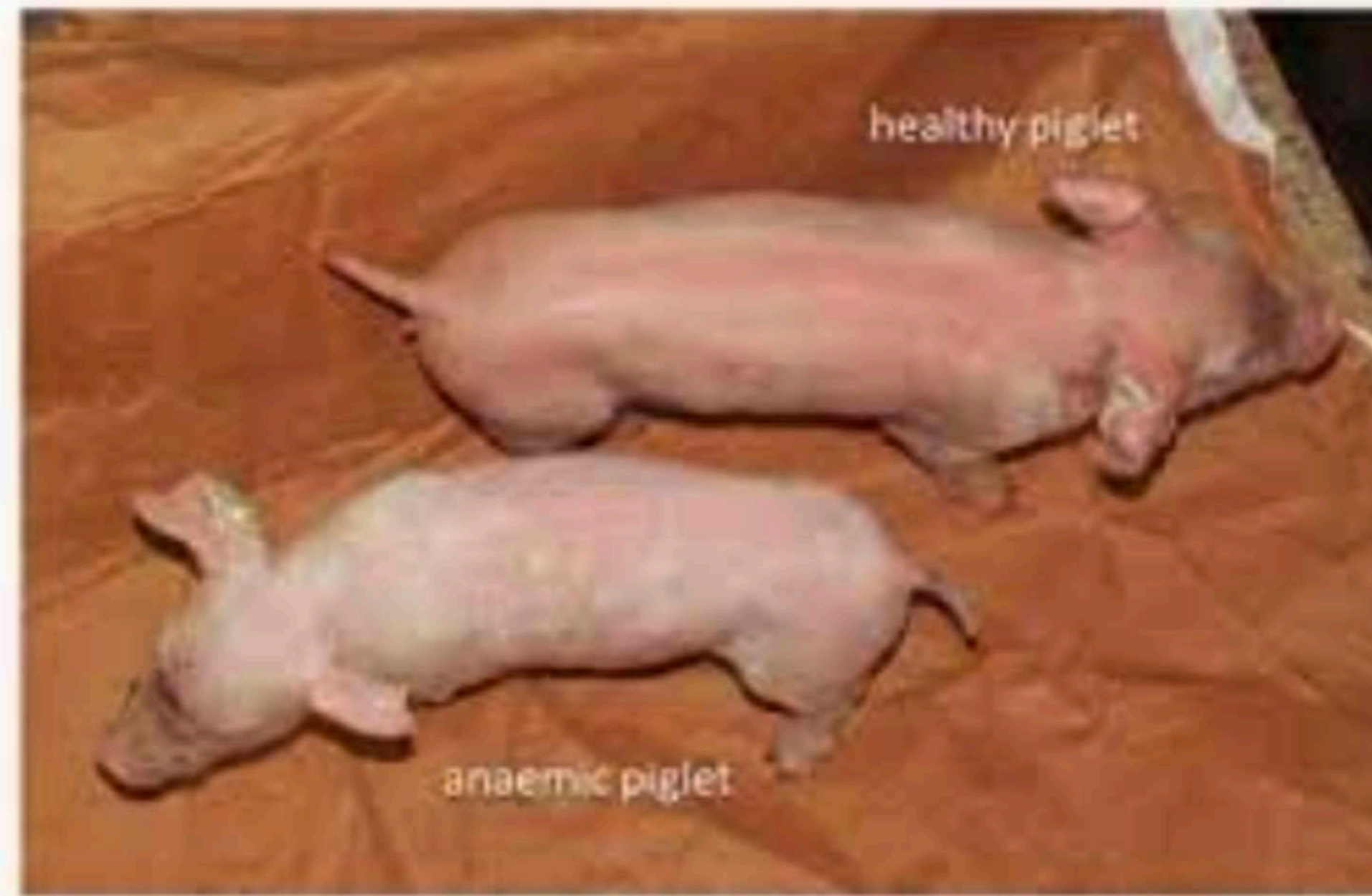


Supplementing stabilized iodized salt (contains 0.007% iodine)



IRON DEFICIENCY

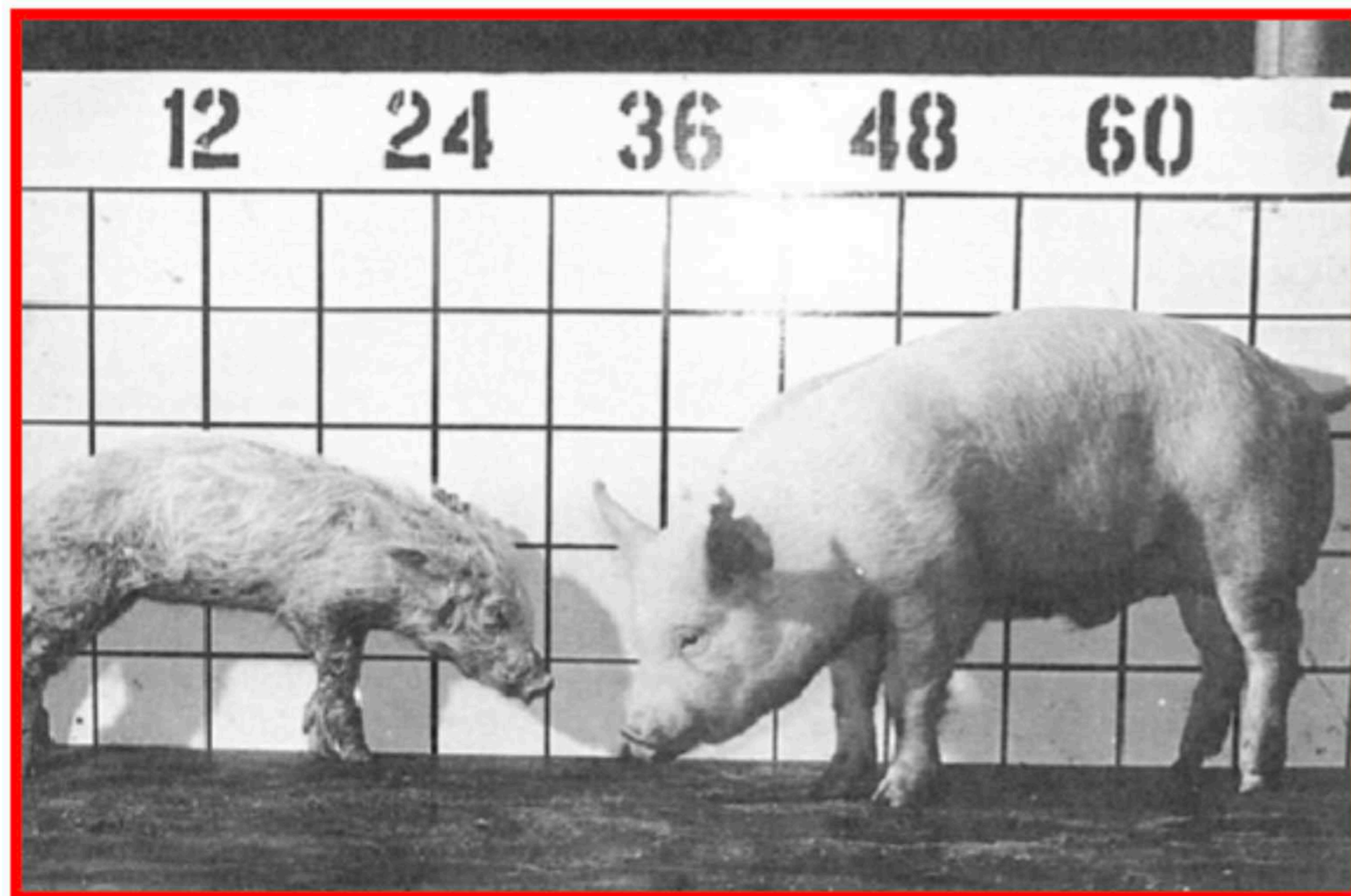
- ▶ Reduces the rate of Haemoglobin formation and produces typical nutritional anemia.
- ▶ Signs of nutritional anemia in suckling pigs include low Hgb and RBC count, pale mucous membranes, enlarged heart, skin edema about the neck and shoulders, listlessness, and spastic breathing (thumps).



Supplemental iron 100–200 mg , by IM injection in the form of iron dextran, iron dextrin, or gleptoferron during the first 3 days of life

ZINC DEFICIENCY

- ▶ Poor growth, poor appetite and a skin thickening called parakeratosis.
- ▶ Parakeratosis in growing pigs, particularly when fed diets high in phytic acid and more than the recommended amount of calcium.



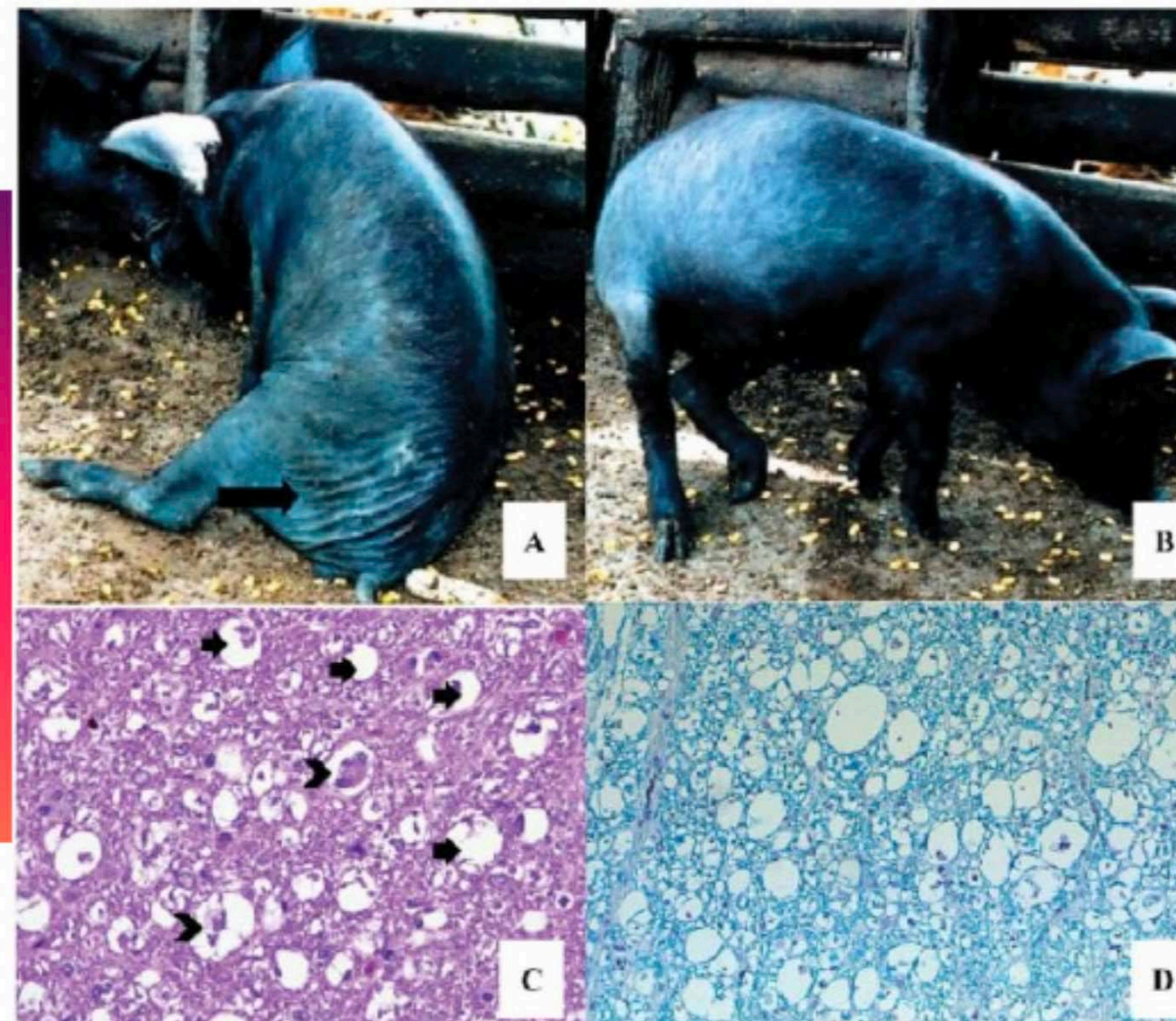
Pharmacologic levels of zinc (1,500–3,000 mg/kg) as zinc oxide have consistently been found to increase pig performance during the postweaning period.



COPPER DEFICIENCY

- ▶ Pigs fed diets that are deficient in Cu have signs of central nervous system disorders such as ataxia, posterior paresis, and horizontal nystagmus

Multifocal peri axonal vacuolization in the brainstem and in spinal cord, discrete amount of axonal spheroids and macrophages in the vacuoles. The luxol fast blue (LFB) stain for myelin showed that the vacuolated sites represent demyelinated areas.



Copper at pharmaceutical levels in the diet (100–250 mg/kg) is an effective growth stimulant for weanling and growing pigs.

SALT DEFICIENCY

- ▶ Poor hair and skin condition
- ▶ Salt-deficient pigs attempt to consume urine of other pigs.

The recommended level of salt is 0.25% in growing and finishing diets, 0.5–0.75% in starter diets, and 0.5% in sow diets.

Animal, fish, and milk byproducts can contribute some of the sodium and chloride requirement.



SALT TOXICITY

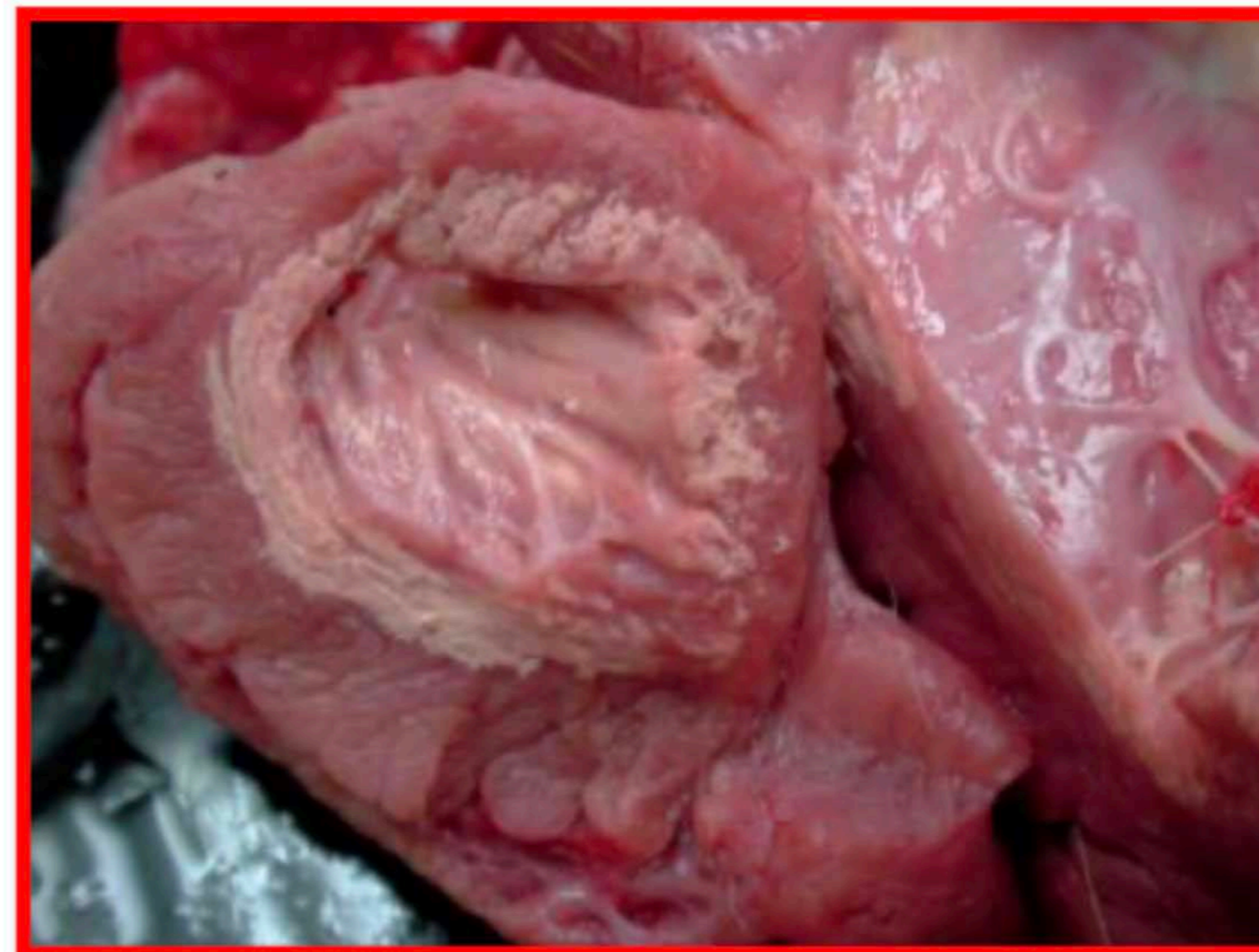
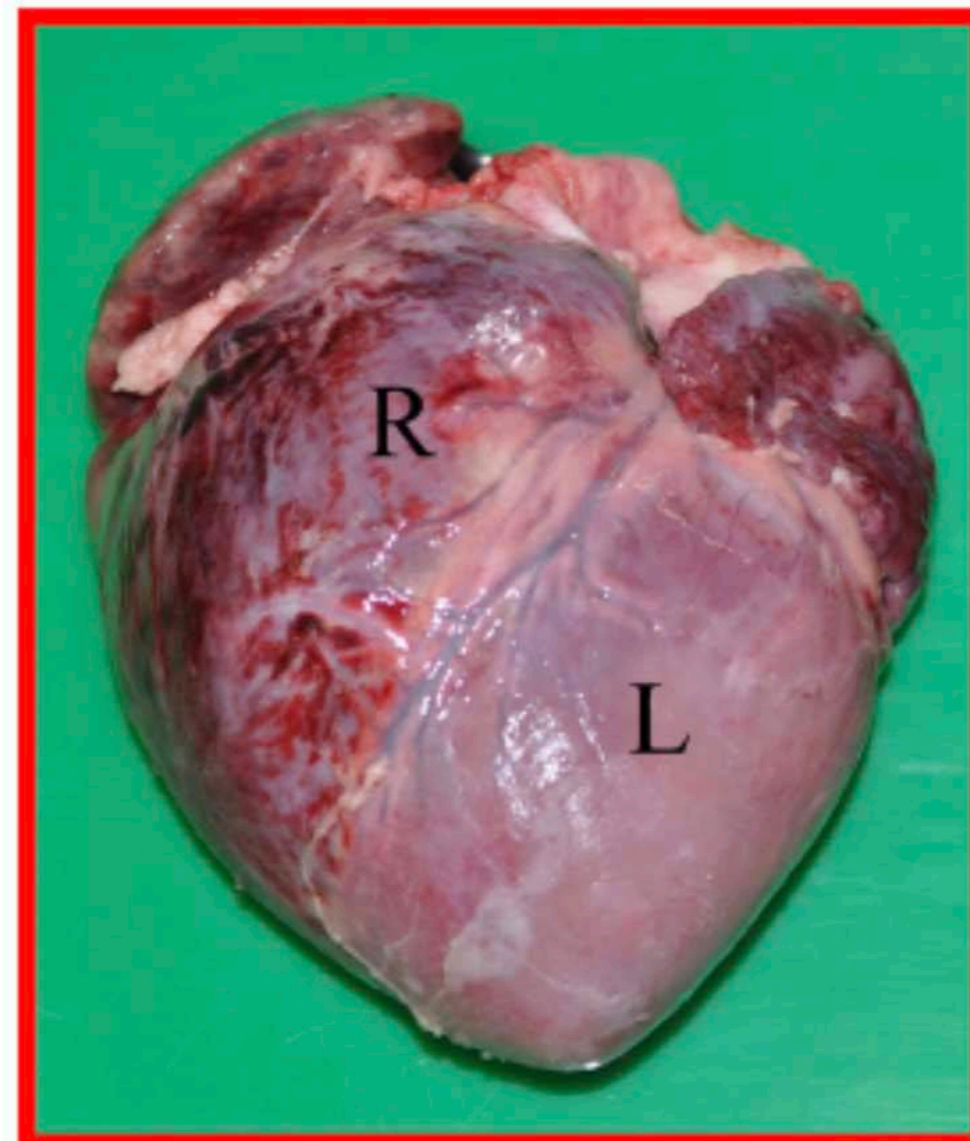
- ▶ Decreased appetite, Not eating.
- ▶ Wandering around apparently blind. / Incoordination.
- ▶ Nausea and vomiting and Diarrhea.
- ▶ Increased thirst.
- ▶ Fever.
- ▶ Nose twitching and possibly a convulsion to follow/seizure. Seizures can present in different ways. There are different degrees of severity when it comes to seizures, some have the classic type where they're thrashing around and others may present more subtly such as a trance like state.
- ▶ Coma.
- ▶ Some pigs will press their heads against a wall and just stand there.
- ▶ Death.





SELENIUM AND / OR VITAMIN E DEFICIENCY

- ▶ Deficiencies can cause sudden death of young, rapidly growing pigs
- ▶ Nutritional Myopathy of Pigs
- ▶ Mulberry heart disease - Selenium (Se) deficiency involved in fatal cardiomyopathy
- ▶ Selenium/vitamin E deficiency in nursing pigs makes them more susceptible to iron toxicosis from iron injections



Supplementing - Green forage, legume hays and meals, cereal grains, and especially the germ of cereal grains

Maximal amount of selenium that can be added to swine diets is 0.3 mg/kg.



VITAMIN K DEFICIENCY

- ▶ Prolonged blood clotting time and may die from hemorrhages.
- ▶ Certain components in moldy feed can interfere with vitamin K synthesis.
- ▶ Excessive levels of dietary calcium interfere with vitamin K activity, causing these signs.



Supplemental vitamin K is recommended at 2 mg/kg of diet as a preventive measure



THIAMINE DEFICIENCY

- ▶ Poor appetite and daily gain, often vomiting, low body temperatures and poor heart rates
- ▶ Neurological symptoms



Supplementing – Whole cereal grains, and bran

RIBOFLAVIN DEFICIENCY

- ▶ Reproduction is impaired.
- ▶ Post pubertal gilts fail to cycle.
- ▶ Deficient sows are anorectic and farrow dead pigs 4–16 days prematurely.
- ▶ The stillborn pigs have very little hair, often are partially resorbed, and may have enlarged forelegs.
- ▶ Growing pigs fed diets low in riboflavin gain weight slowly and have a poor appetite, a rough coat, an exudate on the skin, and possibly cataracts.

Supplementing green forage, milk by-products, brewer's yeast, legume meals, distillery by-products.

NIACIN DEFICIENCY

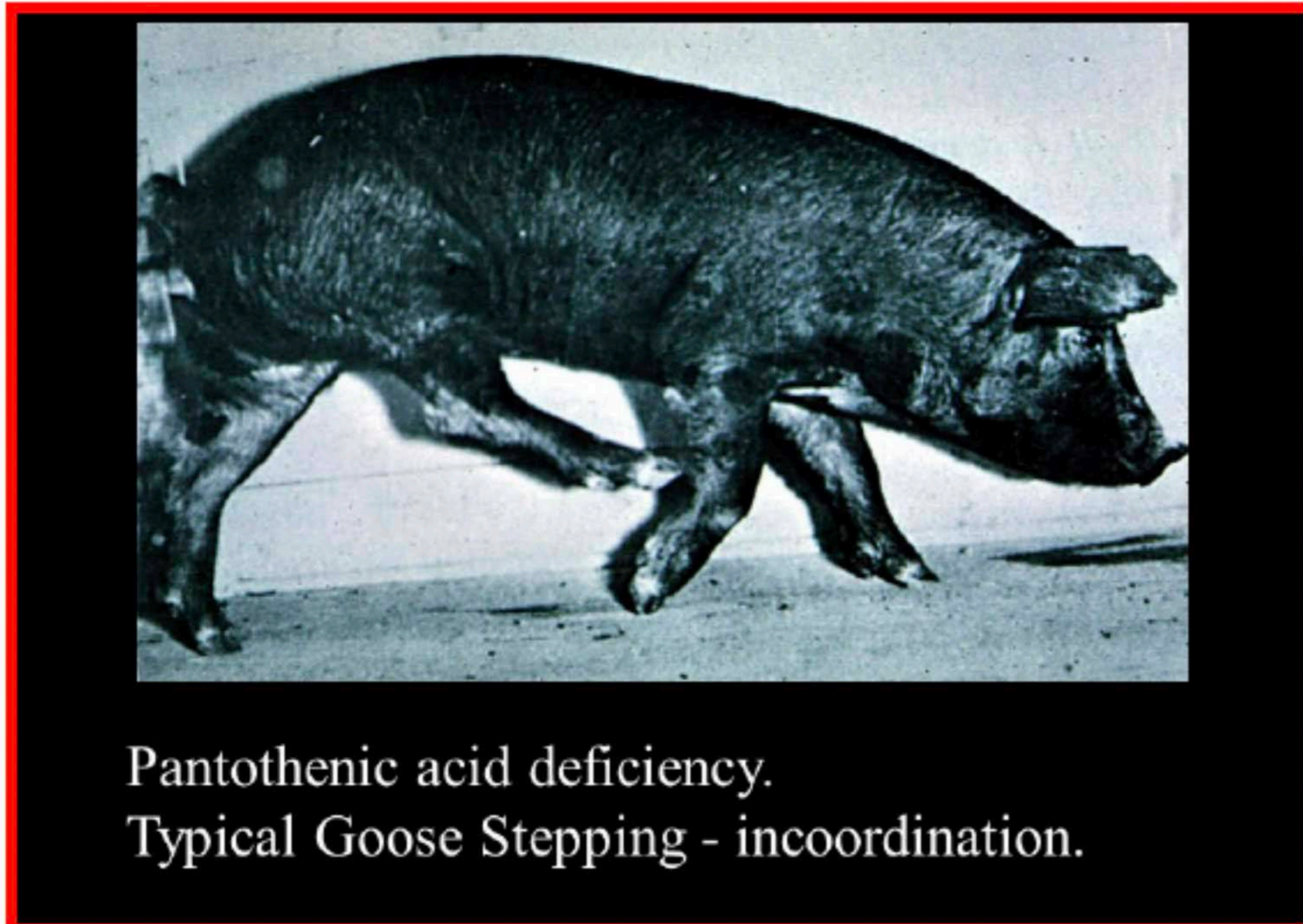
- ▶ Inflammatory lesions of the digestive tract and exhibit diarrhea.
- ▶ weight loss.
- ▶ Rough skin and coat.
- ▶ Dermatitis on the ears.

Supplementing fish and animal byproducts, brewer's yeast, and distiller's solubles.



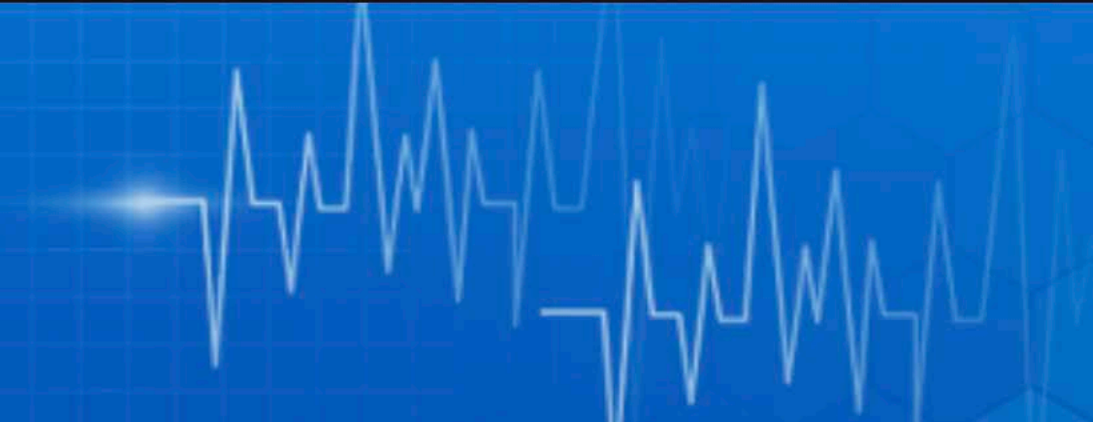
PANTOTHENIC ACID DEFICIENCY

- ▶ “Goose-stepping” gait, ataxia, and a noninfectious bloody diarrhea



Pantothenic acid-responsive degenerative myelopathy

Supplementing green forage, legume meals, milk products, brewer's yeast, fish solubles, and certain other byproducts.

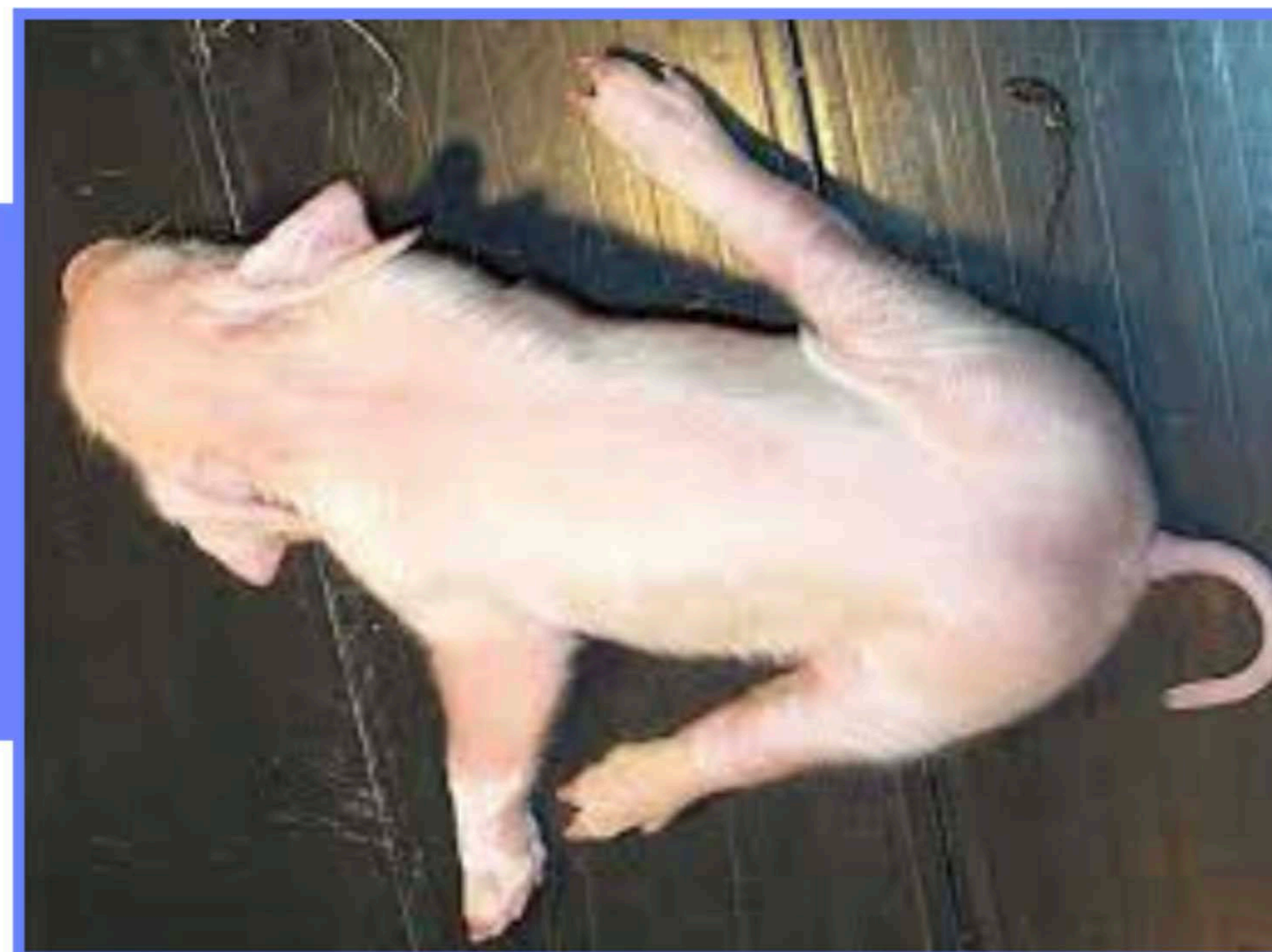


CHOLINE DEFICIENCY

- ▶ Incoordination and an abnormal shoulder conformation.
- ▶ At necropsy, they may have fatty livers and usually show kidney damage.
- ▶ Sows deficient in choline have reduced litter size and may give birth to spraddle-legged pigs.

Choline supplemented at 440–800 mg/kg of diet increased litter size in gilts and sows.

Natural sources of choline include fish solubles, fish meal, soybean meal, liver meal, brewer's yeast, and meat meal.





BIOTIN DEFICIENCY

- ▶ Excessive hair loss
- ▶ Skin ulcerations and dermatitis
- ▶ Exudates around the eyes
- ▶ Inflammation of the mucous membranes of the mouth
- ▶ Transverse cracking of the hooves, and cracking or bleeding of the footpads.



Biotin is present in highly available form in corn and soybean meal.

VITAMIN B12 DEFICIENCY

- ▶ **Hyperirritability**
- ▶ **Voice failure**
- ▶ **Pain and incoordination in the hindquarters.**
- ▶ **Histologic examination of the bone marrow reveals an impaired hematopoietic system.**
- ▶ **Fatty livers are also noted at necropsy.**

Vitamin premixes for swine

What was learnt

- ▶ *Deficiencies of*
- ▶ *Energy*
- ▶ *Protein*
- ▶ *Vitamins*
- ▶ *Minerals*



Thank you