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NEBRASKA COOPERATIVE EXTENSION SERVICE-E.C. 81-1905



Prevent Worms...

TO INCREASE SHEEP PROFITS



Extension work in "Agriculture, Home Economics and Subjects relating thereto,"
The Cooperative Extension Service, Institute of Agriculture and Natural
Resources, University of Nebraska-Lincoln, Cooperating with the
Counties and the U.S. Department of Agriculture
Leo E. Lucas, Director

PREVENT WORMS . . . to increase sheep profits

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INTRODUCTION

Internal parasitism is one of the most important sheep problems in Nebraska. Every flock is affected to some degree. These parasites reduce profits by retarding growth, lowering feed efficiency, reducing resistance to other diseases and frequently causing death. For sheep production to be profitable in Nebraska, internal parasites must be controlled.

DIAGNOSIS OF WORMS

Problems encountered in the diagnosis of parasitism and accompanying disease require the skill, judgment, and trained eye of the veterinarian.

To determine if sheep are infected with worms, a fresh fecal sample is collected. A weighed amount of fecal material is mixed with a concentrated salt or sugar solution that causes the worm eggs to float. The eggs are then collected on a glass slide and counted. This procedure determines the number of worm eggs per gram of feces. The larger the number of adult female worms inside an animal, the greater the concentration of eggs in the feces. Accurate identification of the numerous species of worms is accomplished by microscopic examination of larvae and eggs.

TYPES OF INTERNAL PARASITES

Stomach Worms

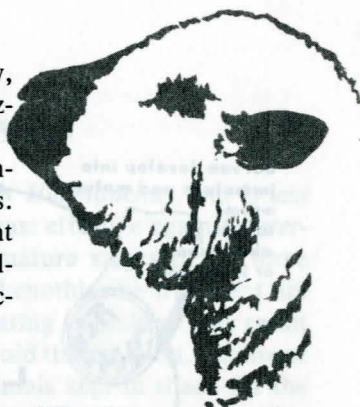
Three stomach worms are found in Nebraska sheep: The large stomach, barberpole, or wire worm—*Haemonchus*; medium or brown stomach worm - *Ostertagia*; and small stomach worm - *Trichostrongylus*.

Haemonchus—Barberpole or Wire Worm. Adult female worms measure 1/2 to 1 inch (1.3 to 2.5 cm) in length. Males are 1/4 to 1/2 inch (.64 to 1.3 cm) long. The name "barberpole worm" arises from the fact that in the female worm the white ovaries are twisted around the intestine.

Haemonchus is the most costly roundworm in Nebraska farm flocks. This worm affects both young and adult sheep. Since the adult worm attaches to the lining of the abomasum (true stomach in the ruminants) and

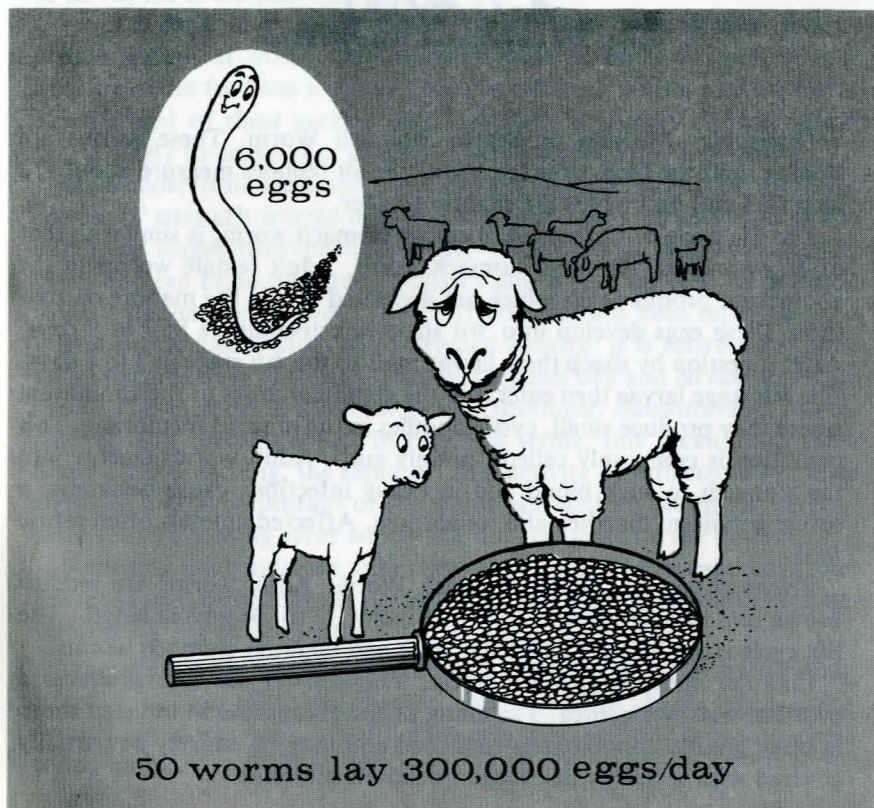
consumes several drops of blood each day, anemia becomes a problem in heavily parasitized animals.

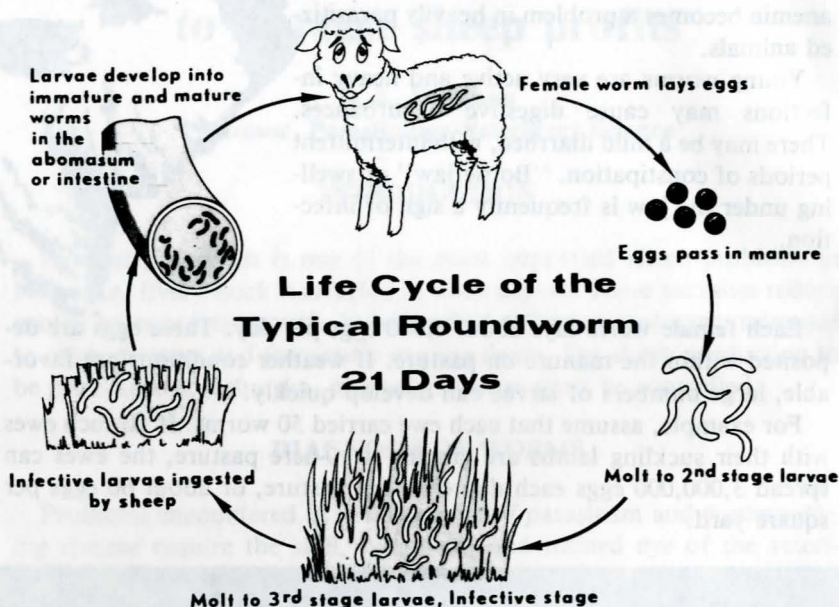
Young worms are very active and heavy infections may cause digestive disturbances. There may be a mild diarrhea, with intermittent periods of constipation. "Bottle jaw" or swelling under the jaw is frequently a sign of infection.



Each female worm lays about 6,000 eggs per day. These eggs are deposited within the manure on pasture. If weather conditions are favorable, large numbers of larvae can develop quickly.

For example, assume that each ewe carried 50 worms. If 10 such ewes with their suckling lambs are grazing a 10-acre pasture, the ewes can spread 3,000,000 eggs each day over the pasture, or about 60 eggs per square yard.





Ostertagia—Medium or Brown Stomach Worm. These worms are smaller than the large stomach worm. Adult females measure about 1/2 inch (1.3 cm) and males are slightly smaller.

The life cycle of *Ostertagia*, medium stomach worm, is similar to that of *Haemonchus*, the large stomach worm. Adult female worms in the abomasum produce eggs which are deposited within the manure on pasture. These eggs develop into 3rd stage infective larvae in 7 to 9 days. After ingestion by sheep these larvae molt to the 4th stage in 3 to 8 days. The 4th stage larvae then enter into the glandular areas of the abomasum where they produce small, cystic nodules in the mucous membrane. This condition is commonly called "pimply gut". Adult worms emerge into the stomach to suck blood and in heavy infections cause weakness, a severe persistent diarrhea and weight loss. Affected animals often refuse feed.

Trichostrongylus—Small Stomach Worm. Adult worms are reddish brown and measure from 1/8 to 1/4 inch (.32 to .64 cm) in length. The life cycle is similar to that of the large and medium stomach worms.

Like the medium stomach worm, *Trichostrongylus* also produces a profuse, watery diarrhea. The lining of the abomasum in infected sheep is often greatly congested or reddened and may be entirely or partially covered with a stringy discharge (pseudomembrane).

Treatment of Stomach Worms

Phenothiazine will effectively remove adult *Haemonchus*, but is less effective in removing *Trichostrongylus* and least effective against *Ostertagia*. It is relatively ineffective against immature stages of all three stomach worms. Toxic reactions following phenothiazine treatment are unusual in ruminants, but eye irritation appearing as pinkeye may result if the sheep are exposed to full sunlight. To avoid this reaction, treatment should be given in the afternoon and the animals kept in shade for the following day.

Particle size and purity significantly affect the worm-killing ability of phenothiazine. When the drug is finely ground and purity improved, the ability is increased. Phenothiazine acts primarily against adult worms and is relatively ineffective against immature stages. Therefore, treatments should be repeated at 2 to 3 week intervals because of the continuous emergence of larvae from the tissues and the continued ingestion of larvae from the pasture.

While a consistent curative effect has not been demonstrated against certain species of worms, the administration of small doses of phenothiazine in the feed has a marked effect on the egg output and the larval development of these species. The reduction in pasture contamination that is likely to ensue is of obvious benefit in the control of worms.

Thibenzole (thiabendazole) is effective against adults of all three species of stomach worms in sheep and has greater activity against the immature stages than phenothiazine. Thibenzole is well tolerated by sheep and can be administered orally or mixed with the feed. In addition to its wide therapeutic index, toxic effects have not been reported.

Thibenzole has ovicidal and larvicidal activity. It is active from three hours to three days following treatment against ova and larvae passed by sheep. This includes *Trichostrongylus*, *Ostertagia*, *Bunostomum*, *Nematodirus*, and *Strongyloides*. In practical terms, this means that three hours after drenching, the rapid ovicidal activity of thibenzole will have sterilized a high percentage of the worm eggs and the sheep can be considered to be passing feces which will not contaminate the pasture.

Following thiabendazole, other benzimidazoles such as cambendazole, fenbendazole, mebendazole, oxfendazole, and albendazole have been developed for use in ruminants.

Tramisol (levamisole hydrochloride) is a broad spectrum anthelmintic effective against both the mature and immature stages of stomach worms, intestinal worms, and lungworms. It is safe for pregnant ewes, young lambs, and sheep of all ages.

Loxon (Haloxon) is an organophosphate. It can be used on young or old animals of either sex—including pregnant ewes. Loxon is highly effective against the adult species of stomach worms and is active against the immature stages of *Haemonchus* and *Trichostrongylus*.

INTESTINAL WORMS

The thread-necked worm, *Nematodirus*, causes considerable damage in lambs 6 to 12 weeks old. This worm lives in the small intestine with its head deeply embedded in the intestinal wall. Adult female worms measure $3/4$ to 1 inch (1.9 to 2.5 cm) and males are $1/2$ to $3/4$ inch (1.3 to 1.9 cm) long.

In areas where clinical infections are common, the disease has a characteristic pattern. Many of the worm eggs passed by infected lambs lie dormant through the remainder of the grazing season and winter with large numbers of larvae appearing during the early grazing period of the following year. Problems of parasitism develop when susceptible lambs are exposed to these heavily contaminated pastures and ingest large numbers of infective larvae.

Control *Nematodirus* by rotating pastures so that spring lambs do not graze pastures used by lambs the preceding fall. Spring lambs can safely graze pastures which were occupied by old ewes the preceding fall because the old ewes are immune to *Nematodirus* and do not shed *Nematodirus* eggs.

For treatment, thibenzole and tramisol are effective against the adults. Low level phenothiazine administration will give some control since it inhibits the development of worm eggs and will cut down on pasture contamination.

Oesophagostomum—Nodular Worm. Nodular worms live in the large intestine. Adult worms measure $3/8$ to $5/8$ inch (.94 to 1.56 cm) in length. Worm eggs are passed in the feces and infective larvae develop in 5 to 6 days on the pasture. After being ingested by sheep, larvae burrow into the intestinal wall and molt to the 4th stage in 5 to 7 days. Larvae return to the intestinal lumen 7 to 14 days after infection, and molt to the adult stage in 17 to 22 days. Eggs appear in the feces 32 to 42 days after infective larvae have been ingested.

In severe infections, a rise in body temperature may appear 4 to 10 days after ingestion of infective larvae. Severe diarrhea, followed by loss of appetite, emaciation, and general weakness can develop 7 to 17 days after infection. As a result of the larval damage, small nodules are produced in the wall of the large intestine. At first, these are only slightly raised areas, but later increase in size and are often filled with pus.

Phenothazine, piperazine, ruelene, tramisol, trichlorfon, and thibenzole are all effective against the adults; no treatment is available which will destroy the larvae in the nodules. Feeding low level phenothiazine has been recommended to prevent egg production by the female worms.

Strongyloides—Intestinal Threadworm. The intestinal threadworm, *Strongyloides*, lives in the small intestine. Adult female worms measure 1/8 to 1/4 inch (.32 to .65 cm) long. *Strongyloides* has an unusual life cycle. Only female worms occur in the parasitic phase of the cycle. These are embedded in the wall of the upper portion of the small intestine.

Small eggs containing live larvae are passed in the feces, hatch rapidly and may develop directly into infective larvae or into free-living adults. Sheep are infected by penetration of the skin or ingestion of larvae.

Heavy infections with adult worms cause a severe diarrhea. Damage to the skin between the claws produced by skin-penetrating larvae resembles the early stages of foot rot.

Thibenzole and ruxel are effective in removing adult *Strongyloides*.

Trichuris—Whipworm. The whipworm, *Trichuris*, lives in the cecum and large intestine. Adult worms are 1 to 1 1/2 inch (2.5 to 3.8 cm) long and their bodies consist of a slender anterior portion and thickened posterior third.

Heavy infections cause inflammatory lesions in the cecum and large intestine. Animals become weak, lose weight, and have diarrhea.

Phenothiazine and thibenzole are not effective against whipworms. Repeated use of these two dewormers in farm flocks may result in a rapid build-up of whipworms, especially in young animals.

Certain organophosphates are effective in removing whipworms.

Tapeworms

The double-pored tapeworm, *Moniezia expansa*, is a common parasite of native sheep in Nebraska. Adult tapeworms live in the small intestine and reach a length of 9 to 12 feet (274 to 366 cm). Heavy infections in young lambs may be fatal.

Large numbers of tapeworms can cause mechanical blockage of the intestine. Tapeworms also absorb nutrients from the intestinal tract and thus deprive the sheep of nourishment.

The fringed tapeworm, *Thysanosoma actinioides*, is a common parasite of sheep in the west. It is a small worm, 10 inches (25.4 cm) long, which lives in the gall bladder and bile ducts of the liver and in the small intestine.

Lambs imported from ranges west of Nebraska are often parasitized by this tapeworm. This worm may block the bile ducts in the liver, caus-

ing bile to spread throughout the flesh of the animal. Losses result from condemnation of livers for food.

Life Cycle of *Moniezia expansa*

Tapeworm segments containing worm eggs pass to the pasture in feces of infected sheep. On pasture the sacs containing the tapeworm eggs rupture, spreading the eggs onto the soil. The eggs must then be ingested by tiny oribated mites which thrive in great numbers in all pastures.

Development of the young tapeworms inside of the mite requires 2 to 5 months. Infected mites are ingested by the grazing sheep and the young tapeworms are released in the small intestine. In about 30 days after ingesting infected mites, sheep begin to pass tapeworm eggs in the feces.

Signs and Diagnosis

Signs attributed to tapeworm infections in lambs are diarrhea, loss of weight and acute convulsions ending in death. These signs are rare in older sheep because they seldom harbor more than 3 or 4 tapeworms. Diagnosis is based on the presence of tapeworm segments or the identification of the characteristically shaped eggs in the feces.

Control of Tapeworms

Control of tapeworms in sheep is difficult because an effective method for controlling mites has not been developed. Mites are in abundance on pasture at all times of the year. Treated animals are reinfected when placed back on pastures contaminated with tapeworm-infected mites.

The drug used for treatment of tapeworm infections is lead arsenate. Phenothiazine, thibenzole, loxon, and tramisol are not effective against tapeworms. Lead arsenate is frequently combined with phenothiazine so that roundworms and tapeworms are treated simultaneously. Two treatments a year will normally reduce the number of tapeworms in a flock.

Niclosamide, cambendazole, and albendazole are also effective against tapeworms in sheep; only niclosamide has been reported to be effective against *Thysanosoma actinioides*.

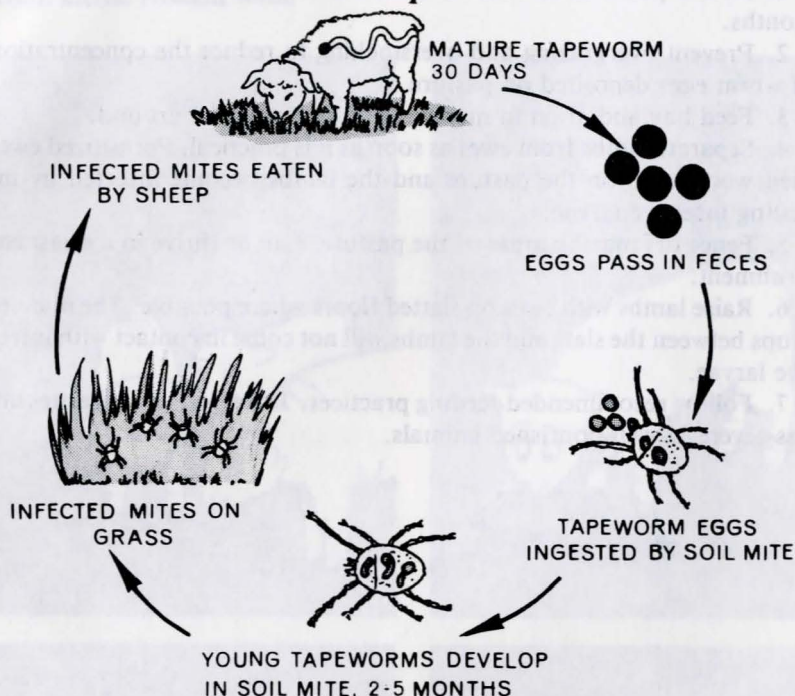
SUMMARY

Eliminate adult worms by periodic deworming

The anthelmintic, dose, and frequency of use are determined by the

LIFE CYCLE OF TAPEWORM

Moniezia expansa



species and number of worms affecting the flock, climatic conditions and the effectiveness of other control measures. Your veterinarian can make a microscopic examination of fecal samples, evaluate his findings and suggest an effective deworming program.

Under Nebraska conditions, sheep should be dewormed a minimum of four times a year. Generally, it is necessary to treat more frequently during the pasture season. Follow the advice of your veterinarian as to frequency of dosing.

Prevent egg laying and larval development

Feeding phenothiazine-salt mixture inhibits egg laying by adult female worms and interferes with larval development. Mix 1 lb. (453.59 g) of NF grade (not drench grade) phenothiazine with 9 lb. trace mineralized salt. Feed this mixture free-choice continually throughout the year in an easily accessible box protected from the weather.

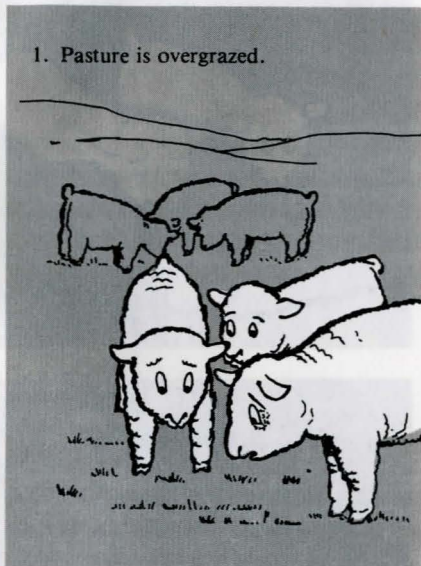
Prevent reinfection

1. Rotate pastures so that each area is free of sheep at least 2 to 3 months.
2. Prevent overgrazing and overstocking to reduce the concentration of worm eggs deposited on pasture.
3. Feed hay and grain in mangers and never on the ground.
4. Separate lambs from ewes as soon as it is practical. Parasitized ewes shed worm eggs on the pasture and the lambs become infected by ingesting infective larvae.
5. Fence off marshy areas of the pasture. Larvae thrive in a moist environment.
6. Raise lambs with ewes on slatted floors where possible. The manure drops between the slats and the lambs will not come in contact with infective larvae.
7. Follow recommended feeding practices. The effects of parasites are less severe in well-nourished animals.

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Worms Become Problems When:

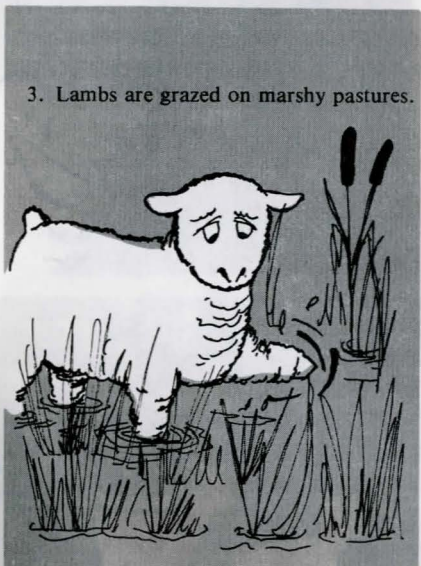
1. Pasture is overgrazed.



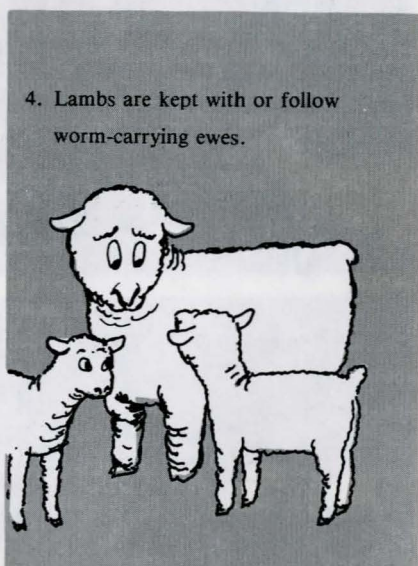
2. Forage is fed on the ground.



3. Lambs are grazed on marshy pastures.

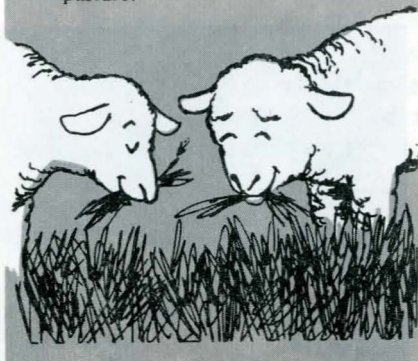


4. Lambs are kept with or follow worm-carrying ewes.



Remedy These By:

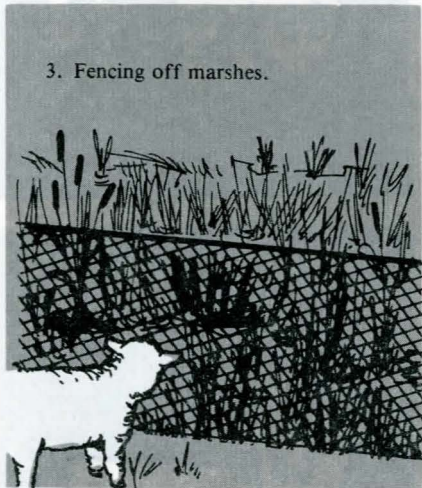
1. Frequent moving to uncropped pasture.



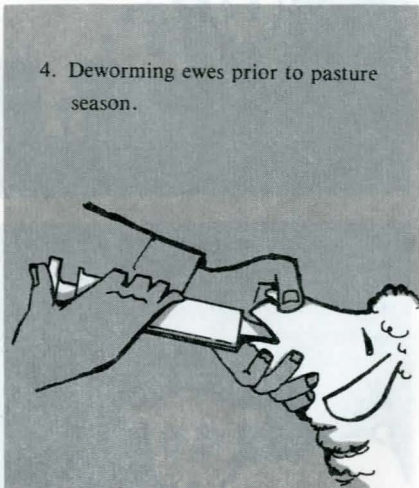
2. Feeding in bunks.



3. Fencing off marshes.



4. Deworming ewes prior to pasture season.



5. Using pasture only for adult sheep, keeping lambs in dry lot.

