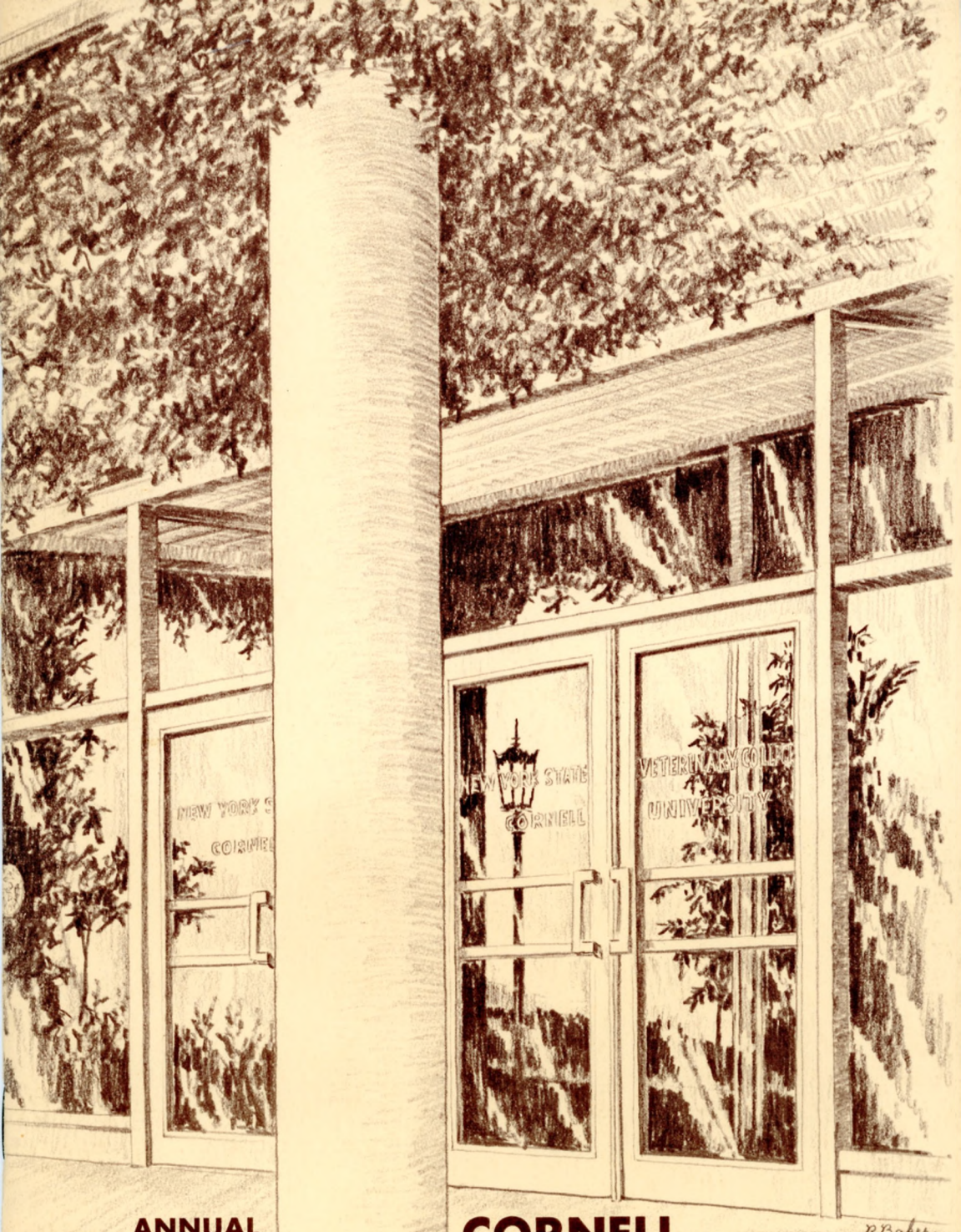

ANNUAL CONFERENCE FOR VETERINARIANS

CORNELL UNIVERSITY 1969

ABSTRACTS
from the
61st Annual Conference
for
Veterinarians

New York State Veterinary College
A Statutory College of the State
University of New York
George C. Poppensiek, Dean

Cornell University
Ithaca, New York

January 28–30, 1969

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THE PROTECTIVE CAPACITY OF COLOSTRUM IN YOUNG CALVES

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Colostral antibody is the newborn calf's main defense against the scours-septicemia complex, for he receives about 95% of his passive immune globulins from colostrum.

Up to 20% of the calves which receive colostrum fail to absorb a significant amount of antibody. Feeding of other proteins before colostrum, premilking of the dam and production of dilute colostrum result in less absorption. Unknown genetic or physiological factors may account for other failures to absorb. Since a calf's ability to absorb antibody declines continuously, he should receive 2 quarts of colostrum as soon as possible after birth.

Specific colostral antibody in the circulation prevents septicemia, while its activity in the gut limits the growth of pathogens. Feeding colostrum for 3–4 days provides protection in the gut even though systemic absorption ceases 2–36 hours after birth. Even market bull calves should be fed colostrum to prevent disease and subsequent environmental contamination. When necessary, colostrum can be stored frozen for at least a year.

The average serum gamma globulin of market calves shows a seasonal cycle. It is highest in the summer and lowest in the winter, the inverse of losses from septicemia. Ninety percent of the calves that die of septicemia are hypogammaglobulinemic. The clinical usefulness of a rapid ammonium sulfate globulin turbidity test to detect hypogammaglobulinemic calves is being assessed. This may permit accurate preventive medication.

ESTRUS SYNCHRONIZATION IN CATTLE

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Estrous cycle synchronization techniques are likely to be most useful in commercial beef cattle operations where they will enable artificial insemination to be carried out on a practical scale and result in more rapid genetic progress. These techniques will also be useful for breeding groups of dairy heifers and possibly groups of lactating cows in very large herds where it is difficult to maintain heat records on individual animals.

Until recently, most methods for artificial cycle regulation have been based on the occurrence of "rebound estrus" following withdrawal of orally active progestational compounds from the feed. Most of these compounds (MAP, CAP and MGA) must be fed daily 18–20 days, and estrus may be expected to follow 3–6 days later. Conception rates of animals inseminated at the synchronized estrus following MAP feeding (180 mg/day) have ranged from 50–60 percent; conception rates at the first breeding following CAP feeding (10 mg/day) have been somewhat lower, 35–40 percent.

Recent research has concentrated on developing methods for synchronization that will allow the entire treatment schedule, including the insemination, to be prescheduled, and will not require the animals to be checked for estrus. These methods involve injections of exogenous gonadotrophins to induce ovulation following the use of progestational, or other compounds to inhibit estrus. Encouraging preliminary data on the use of one of these methods, which involves administration of a progestational compound in a long-acting rumen bolus, two gonadotrophin injections 96 hours apart and insemination 24 hours later, were presented.

THE USE OF ESTRUS SYNCHRONIZING DRUGS FOR THE TREATMENT OF CONCEPTION FAILURES

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Reproductive herd health programs are necessary to make an accurate diagnosis of infertility problems in cattle. Regular examination of the entire herd, accurate records, evaluation of management ability, conception rate of bulls, and diagnosis of infectious diseases are all essential to a program.

Estrus synchronizing drugs show some promise in treating conception failures due to hormone imbalances. Twenty cows with follicular cysts were treated with Repromix (Tuco-Products) for 18 days, thirteen conceived on the first service. Eighteen cows that were problem breeders were put on Repromix for 21 days post service, and eleven conceived.

These results, in my opinion, warrant the further study of the clinical use of progesterone.

PROGESTIN THERAPY FOR CYSTIC OVARIES IN CATTLE

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A clinical trial was conducted to determine the effectiveness of Repromix® (6-methyl-17 acetoxy-progesterone), an oral progestin, in the treatment of follicular cysts in dairy cattle. Cows found to be cystic were allotted ran-

domly to one of three groups. Group I was treated by manually rupturing the cysts. In Group II all cows received 10,000 units of luteinizing hormone intravenously and the cysts were ruptured. Group III received 200 mg. of Repromix® orally for 10 consecutive days following rupture of the cysts Cows were at least 50 days post-partum and were bred on the first estrus following treatment.

The following results were obtained.

	I Rupture	II L. H. & rupture	III Repromix & rupture
% Recovery	55	78	86
% Conception within 20 days	16.7	25	51
% 1st service conception	50	50	58

The above results indicate that administration of Repromix in addition to manual rupture of the cysts proved the most effective treatment. Observations also indicated more rapid recovery and the time of the next estrus to be more predictable. One notable disadvantage is that Repromix must be fed daily, which presents a particular problem in pen stabled herds.

Repromix® is produced by the Upjohn Company and is sold only as a heat synchronization product. The company makes no claims as to its effectiveness in the treatment of follicular cysts.

ORIGIN AND FUNCTION OF LEUKOCYTES IN MASTITIS

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Cells in normal milk are mostly of epithelial origin and seldom exceed 100,000/ml. Injury to mammary tissue leads to movement of polymorphonuclear leukocytes (PMN) from blood to milk. In mastitis, cell counts initially attain many millions/ml., mostly blood leukocytes. As the mastitis becomes chronic, cell numbers fall to levels of 1 to 5 million/ml. Both PMN leukocytes and epithelial cells are present. When no distinction is made between cell types, the designation "leukocyte count" is inaccurate. Somatic cell count is preferable.

The PMN leukocyte has its origin in the bone marrow. As PMN leukocytes leave the blood to enter the milk, the bone marrow reserve of cells is called upon to replenish the blood. This in turn leads to an intensification of PMN leukocyte production by the bone marrow. Once demand and supply reach equilibrium, the cow is capable of maintaining a continuous diapedesis of millions of PMN leukocytes into the milk. One function of PMN leukocytes is to alter capillary permeability so that humoral elements of the blood flow

into the injured area. Cows made neutropenic are incapable of developing mastitis even though their mammary quarters are severely irritated with *E. coli* endotoxin or crude *S. aureus* toxin.

Phagocytosis of bacteria is a well-known function of PMN leukocytes. When leukocytes counts in milk are elevated in infectious mastitis, bacteria counts fall. Thus PMN leukocytes, by reducing bacterial activity within the gland, protect mammary tissues from rapid and complete destruction. Older cows generally have PMN leukocytes in their milk as a result of previous infections or perhaps milking stresses. As long as somatic cell counts remain less than 500,000/ml. in foremilk, it is suggested that this be viewed as beneficial to older cows. The PMN leukocyte component will serve as a protective barrier against development of acute coliform mastitis as the patency of the streak canal increases with lactation age. A tolerance for limited numbers of PMN leukocytes in milk of older cows is recommended.

A POSSIBLE BREAKTHROUGH IN MASTITIS CONTROL

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Over 97 percent of udder infections and mastitis are due to 4 gram-positive organisms, *Str. agalactiae, Str. dysgalactiae, Str. uberis* and *Staph. aureus.* There is a good correlation between quarter infection and the number of leucocytes in the milk. Ninety percent of the quarters infected with *Str. agalactiae,* 77 percent of the quarters with *Staph. aureus* and 57 percent of the quarters with other streptococci give 2+ or greater reactions to the Modified Whiteside test. However, 30 to 40 percent of quarters showing a 2+ reaction in milk to conventional mastitis tests may be negative on culture.

Various methods of control of udder infection include immunization, genetic selection, regulation of the milking machine and vacuum, eradication of the *Str. agalactiae* form of mastitis, general sanitation practices and antibiotic therapy. Some of these methods are impractical, uneconomic, or of limited value. English workers have shown the effectiveness of combining teat disinfection (40,000 ppm solution of sodium hypochlorite after milking) with antibiotic therapy of all drying-off cows to reduce existing udder infections.

A relatively simple, practical control program for mastitis was jointly undertaken over a year ago by the Department of Animal Science and the New York State Mastitis Control Program. The program involves field observations from 27 herds (1750 cows) and will run for 3 years. The antibiotic being used is 1 million units of procaine penicillin plus 1 gram of dihydrostreptomycin, in a 3 percent aluminum monostearate peanut oil vehicle.

Preliminary results of the first 65 weeks of this relatively simple mastitis control program indicate a marked reduction in udder infection and clinical mastitis in the experimental herds.

URETHRAL OBSTRUCTION IN THE CAT — ETIOLOGICAL FACTORS

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Some of the theories concerning causation of feline urethral obstruction have implicated avitaminosis A, crystalluria, high ash diets, bacterial infections, and protein factors. The purpose of this investigation was to study some of these factors in the hopes that an etiologic hypothesis could be derived.

Twenty cats with urethral obstruction were necropsied. There was no histologic evidence of the typical squamous metaplasia which occurs in experimentally produced avitaminosis A.

Crystalluria was a normal finding in all cats. The crystals were identified as struvite ($NH_4Mg\ PO_4 \cdot 6H\ O$) and were observed in urine samples with a pH as low as 6.0. There was no difference in the numbers of struvite crystals between unaffected and affected cats. Many urine samples from obstructed cats contained few crystals.

Struvite crystals occurred in all feline uroliths and urethral plugs analyzed. The amount of struvite crystals produced per day in normal male cats was between 20.3 and 108.3 mg. The amounts were not increased in cats with a history of urethral obstruction, or in cats during acute obstruction. Diet and urinary pH were shown to influence the mean crystal weight per day. Urethral obstruction was produced in cats by injecting large amounts (400 mg.) of artificial and natural struvite crystals. However, the injected amounts were never reached in any of the cats with spontaneous urethral obstruction. Previous workers hypothesized that struvite crystals were the primary cause of urethral obstruction. This hypothesis was not supported; rather it was concluded that additional factors were necessary for occurrence of the disease.

Microorganisms were not generally cultured from the urine of cats with urethral obstruction. These results differed from others who have stated that cystitis was almost always present with urethral obstruction. Proteinuria was present in many of the urine samples from obstructed cats; however, this resulted from leakage of serum proteins into the urinary bladder.

Physical and immunologic methods demonstrated the presence of an apparently unique protein that was found in urethral plugs and in urine of cats with urethral obstruction. Urethral obstruction was produced by inoculating centrifuged urine from cats with urethral obstruction into the urinary bladders of unaffected cats. Filtration of urine from affected cats did not remove the causative factor.

Picornaviruses ("pico" implying small and "RNA" referring to the nucleic acid type) were isolated from muscle and urine of obstructed cats on primary monolayer feline kidney cells. These 2 isolates were inoculated into the

urinary bladder of adult male cats. None of the 4 cats inoculated with muscle isolate developed urethral obstruction within 60 days postinoculation. Three out of 4 cats inoculated with the urine isolate developed urethral obstruction within 30 days. The results of this study support the possibility that the urine isolate may be the cause of natural urethral obstruction in cats. However, it must be emphasized that additional transmission studies are needed to understand their significance.

Picornaviruses are known to cause respiratory diseases in cats; it is possible that picornavirus isolates are not confined to the respiratory tract but may persist in other tissues. Studies are needed to more fully understand the relationship of the muscle and urine picornavirus isolates to the respiratory picornaviruses.

DIAGNOSIS, PROGNOSIS AND TREATMENT OF RENAL DISEASE IN THE DOG AND CAT

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In chronic renal failure, the first signs the owner can usually detect are polyuria and polydipsia. If this hint of disease is not observed, the animal is usually not presented for diagnosis and treatment until he is in uremic crisis. Vomiting, dehydration, injected sclera, oral ulcerations, discoloration of the tongue, and occasionally muscular tremors may be present when crisis develops.

A number of commonly used laboratory tests are available, including urinalysis, blood urea nitrogen level, serum creatinine level and phenolsulfonphthalein excretion, for evaluating the functional status of the kidneys. While these tests provide valuable information on renal function, a precise pathologic diagnosis is not usually possible, at least at the initial examination. A renal biopsy is often of great value in making a definitive diagnosis and in establishing the potential reversibility of the lesion in the kidneys.

Rehydrating with lactated Ringer's solution and then attempting osmotic diuresis using 10% dextrose is often helpful in improving the state of the uremic animal. When the signs of uremic crisis have subsided sodium chloride, sodium bicarbonate, B complex vitamins and a low protein diet are often helpful in maintaining the patient satisfactorially for prolonged periods of time.

Acute renal failure can often be managed successfully in the same manner. Healing of the lesion may be complete and prolonged therapy is usually not essential.

In any uremic animal, the possibilities of either prerenal or postrenal uremia must be considered. The history, physical examination, other laboratory tests and radiology usually enable the veterinarian to separate prerenal and postrenal uremia from that of renal origin.

RADIOGRAPHY OF THE UROGENITAL TRACT

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I. Preparation: Fast and withhold water, and use cathartics or enemas as necessary.

II. Available Radiographic Procedures

1. The survey radiograph (routine prerequisite to all subsequent special studies)
2. Retrograde urography
   a. Pneumocystography (air in urinary bladder)
   b. Positive contrast cystography (organic iodine solution in bladder)
   c. Double contrast cystography (contrast medium plus gas)
   d. Urethrography (organic iodine solution in urethra)
3. Excretory urography (intravenous injection of organic iodine which is excreted with urine). Manipulation of compression bands and/or timing of post injection radiographs permit visualization of:
   a. Renal collecting tubules
   b. Renal pelvis
   c. Ureters
   d. Urinary bladder
4. Pneumography (injection of gas into tissue spaces)
   a. Pararectal retroperitoneal injection of CO_2 (outlines kidneys and adrenals)
   b. Intraperitoneal injection of air or CO_2 (visualizes abdominal viscera)
5. Renal angiography (arterial or intracardial injection of contrast medium; (visualizes renal vessels)

III. The normal radiographic appearance of genitourinary structures was described, followed by a discussion of some of the abnormalities encountered by the radiologist.

Structure	*Lesion*
Kidneys	Dysgenesis, hypoplasia, hydronephrosis, compensatory hypertrophy, nephrolithiasis, traumatic rupture of capsule, nephritis and pyelonephritis, tumors, parasites (Dioctaphyma).
Ureters	Ectopic ureter, adhesions-stenosis-obstruction (post traumatic or post surgical), calculi.

Structure	*Lesion*
Urinary Bladder	Developmental defects, diverticulum, acute or chronic cystitis, emphysema, traumatic rupture, prolapse, herniation, atony, calculi, tumors.
Urethra	Calculi, mucus plugs (especially in male cats), urethritis.
Prostate	Hypertrophy, prostatis, calculi, tumors.
Testes	Cryptorchidism, tumors.
Uterus	Pregnancy and its complications, metritis, retention cysts, tumors.

REPRODUCTIVE DISEASES IN THE DOG

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Puberty occurs when the bitch attains full growth plateau, which varies from 6 to 9 months for toy breeds to 14 to 24 months in large breeds.

Estrus occurs more frequently in the fall and spring but can occur throughout the year. Small breeds may have cycles as short as 4 months whereas Beagles average 7 months. The intervals between estrus tend to increase with age and aged females may have extended periods of anestrus. Proestrus averages 9 days, but may vary from 3–24. Estrus averages 9 days but may vary from 3 to 31 days. Females may refuse male for as long as 3 days after fully cornified cells are present in the vaginal mucus. Ovulation usually occurs during first 2 days of estrus.

Spermatozoa can survive in the reproductive tract of the bitch for as long as 11 days. The disappearance of spermatozoa is associated with the onset of metestrus, not with the length of time they are present in the uterus. It has been demonstrated that maximum fertility is observed when mating occurs during the first 4 days of estrus. On day 5 fertility drops 50% and declines steadily thereafter.

Administration of estrogen brings bitch into estrus behavior but estrogen treated females are not fertile.

The effects of estrogen on hair growth are not as constant as the literature would lead us to believe. The most striking toxic reactions are reflected in the blood picture. A leucocytosis is produced concurrent with gradual oligocythemia, thrombocytopenia and agranulocytosis followed by leukopenia and increased clotting time of the blood. The condition is reversible if treatment is withdrawn sufficiently early. Alpha estradiol given at the rate of 5 mg per day will kill dogs within 30 to 130 days. Papillary cystadenomas of

ovary have been produced by chronic treatment of bitches with sublethal levels of stilbestrol. Long acting progestational compounds should not be used because of possible induction of cystic hyperplasia of endometrium.

Corpora lutea reach their maximum size by the 13th day of metestrus. By the 20th day regression begins and occurs slowly over an extended period of time. There is considerable individual variation in the rate at which copora lutea regress during metestrus, and the rate may be associated with signs of pseudopregnancy.

Gonadotropin therapy should be investigated more thoroughly as a method for inducing estrus cycles. In controlled trials results have been disappointing.

UROGENITAL TRACT SURGERY

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The management of urolithiasis in the small animal practice is a problem that requires both a medical and surgical approach. Only after a thorough trial of medical therapy is there an indication for surgery in most patients. There is at present no surgical procedure that offers aid in the prevention of formation of urinary calculi. The main aim of surgery is to offer relief from an acute obstruction or, as an elective procedure, to create a more effective opening for the passage of uroliths.

Various procedures are available for this type of surgery. Familiarity with more than one approach to urethrostomy in the cat will allow the surgeon to choose an operation that gives the patient a second chance should the first procedure fail. This is best accomplished by performing the urethral surgery on the most distal portion so that revision, if necessary, will not be compromised by lack of length of the urethra. At this time perineal urethrostomy is believed to have the least complications and the best long term results. It is considered to be the procedure of first choice. Failure at this site can be followed by pre-pubic urethrostomy to prolong the life of the patient.

THE ROLE OF THE VETERINARIAN IN PROFITABLE CALF PRODUCTION

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The role of the veterinarian in profitable calf production depends upon the type of calf production enterprise under consideration. During the past few years we have seen the development of specialized calf raising opera-

tions designed to produce veal calves or feeder calves. Some of these have a capacity of several hundred and a few of these enterprises appear to be highly successful. Despite the fact that they are raising large numbers of calves purchased from random sources, in close confinement, their disease problems appear to be minimal.

Operators of these large successful calf raising enterprises seem to have learned some of the secrets of success, and they have done so without significant help from the veterinary profession. Some of the common factors apparent in the successful operations are:

1) Excellent management with frequent careful observation of calves.
2) Early vigorous medication of sick calves continued for several days after apparent recovery. Prompt culling of those that don't respond.
3) Excellent ventilation with draft-free air flow.
4) Only calves of the same age kept in a unit with each unit physically separated from others.
5) Limited feed intake during the first week.

It is unreasonable to expect operators of large calf raising enterprises to call a veterinarian to treat each calf that gets sick. The cost would be prohibitive and their margin of profit is too small. More significantly, when a veterinarian makes an eyeball diagnosis of "scours" and leaves some medication, he hasn't done anything that the farmer couldn't do as well himself. Owners of farms with several hundred calves at stake don't want that kind of service. They would however, appreciate a careful necropsy on calves that die with the diagnosis confirmed by appropriate laboratory tests, so that they can begin rational measures to protect the other calves. In short the owners of specialized calf operations have become so sophisticated in their approach that they are not interested in diagnosis based upon educated guess no matter how "educated" that guess may be. They have too much at stake to be otherwise.

The more commonly encountered situation is the dairyman who raises a few calves as herd replacements. Here the veterinarian's role is different. Dairymen experience 15–20% calf mortality, year in and year out. Because calves are not their source of income, they are more tolerant of losses and this may be why their losses are so high. Because calves on a dairy farm do not produce direct income, they don't get the quality of attention, facilities or feed that they need. Too often they are kept in unsanitary, poorly ventilated makeshift facilities that become hotbeds of infection. New calves are put into the pen regularly, and just as regularly they die despite exposure to massive doses of antibiotics administered by the farmer who has fallen victim to drug ads.

What is the veterinarian's role in these circumstances? First he may need to be an educator. He should teach the dairymen the importance of sanitation, ventilation, nutrition and frequent observation. He should help the dairyman to understand the pathogenesis of disease and the physiological changes that it produces. And there will be occasions when the kindest and most honest thing he can do is to tell a dairyman that he should stop trying to raise calves. Some dairymen simply don't have the necessary time, interest or ability.

Regardless of the type of calf raising enterprise, the veterinarian's most important role will be that of a diagnostician with somewhat less emphasis on therapy. Generally, we have tended to put calf diseases in one of three broad classifications, respiratory, enteric or septicemic, with little regard for the variety of etiologic agents in each syndrome. Standard therapy consists of the broad spectrum antibiotics that are most likely to be effective. If we limit our services to this routine, we have nothing more to offer than a good herdsman and hence have no useful role to play in profitable calf production.

If, however, we utilize all our training our services will be indispensable. Through culture, histopathologic and serologic techniques we can determine whether a scour problem is a result of colibacillosis, salmonellosis or something else. In these examples and many others, the best therapy and preventive measures are quite different although the symptoms are similar. Certainly the recommended therapy would be more effective if we evaluated the patient more carefully and used whatever supportive measures were indicated. Simple things like blood transfusion for a septicemic calf, or oxygen for one with respiratory distress are very effective and create a favorable impression. Yet they are usually not done because we feel the client "can't afford it." The client is the best judge of what he can afford and our responsibility in this regard ends when we give him an estimate of cost and a prognosis. If he authorizes it, use the best and most complete therapy available. The important thing is that the farmer has made the decision and you have not arbitrarily put yourself in the position of using minimal therapy for imagined economic reasons. Minimal therapy, with calves especially, usually produces minimal result and secondarily a poor opinion of the veterinarian.

In short, there is a place for the veterinarian in profitable calf production when his services, therapy and advice are superior to that of the farmer himself.

PRACTICAL EQUINE NUTRITION

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The primary nutrients to consider when balancing horse rations are energy, protein, calcium, phosphorus and vitamin A. Of course water and salt should be provided free choice. Many horses are too fat because of lack of exercise and too much dietary energy. Horses fed only poor quality hay may be lacking in energy. Estimated requirements are shown below.

*TDN REQUIREMENTS**

FUNCTION	POUNDS
Maintenance	0.8/100 lb of body weight
Growth	1.5/lb of gain
Lactation	0.2/lb of milk produced
Work	1.0/hr of medium work

* Total Digestible Nutrients

Weanling horses require 14–16% protein, yearlings 12–13% and mature horses 8–10%. Preliminary studies indicate protein quality is important for maximum growth of weanlings. Calcium and phosphorus are the two minerals most likely to be deficient in horse rations. Nutritional secondary hyperparathyroidism may result if the diet contains more phosphorus than calcium. Iodine and selenium deficiencies may be geographically localized problems.

Horses are not efficient in the conversion of carotene to vitamin A; deficiency may result if horses are fed poor quality hay for prolonged periods.

ALLERGY IN CATTLE — A SUMMARY

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Allergy or *Hypersensitivity* is the state of increased reactivity of an animal to a substance which is harmless to other members of the same species. It is essentially detrimental to the host.

Theory. The allergen invades the allergic host, interacts with "special" antibodies, and causes release of histamine etc. which quickly produce increased blood vessel permeability and smooth muscle contraction. These in turn are responsible for the clinical and pathological findings.

Incidence. Most common in dairy and beef breeds, particularly Channel Island breeds. Males and females of all ages from 3 months up. Morbidity and mortality rates are very variable. Acute allergic disease can be fatal.

Etiology.

(a) "Induced by man" thru vaccines, toxoids, antisera, "treated" antisera, corticosteroids, hormones, antibiotics, penicillin, penicillin and streptomycin, neomycin and oxytetracycline.

(b) "Partially induced by man" thus retention of own milk, rupture of warbles.

(c) "Natural Allergies (atopies)".

Clinical Description. Allergic disease may be generalized if the allergen gains parenteral access to the body, or it may be localized to one body system associated with the route of entry of the allergen, e.g. airborne allergen — respiratory symptoms; allergen per os — alimentary tract disturbance. Either may later become generalized.

Prevention. The allergic state may persist for life. Beware of parenteral injections of "notorious" biologics. Check cattle after injections. To prevent milk allergy, milk regularly. Control warble flies without macerating the larvae. Avoid contact with "natural" allergen (very difficult). Desensitization and treatment methods (normal and emergency) may be possible.

THE ACTION AND USE OF CORTICOSTEROIDS

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Undesirable physiological responses are the major deterrent in the use of glucocorticoid hormones. The problems of sodium retention and potassium loss have been resolved by the newer synthetic glucocorticoids which are virtually devoid of mineralocorticoid activity. Unfortunately, no compounds are yet available which separate anti-inflammatory activity from undesirable side effects such as ACTH depression, inhibition of wound healing and increased susceptibility to infection.

In an animal receiving systemic glucocorticoids for joint lameness, emergency surgery may become a particularly hazardous venture. Because of the strong possibility of suppression of the adrenal cortex, glucocorticoid administration should be continued to carry the animal over the stress of surgery. The dosage should be reduced gradually following recovery, and the administration of ACTH begun. Delayed wound healing is related to the anti-anabolic effect of the glucocorticoids. There is reduced synthesis of collagen and other proteins. The tensile strength of healing wounds is directly related to the collagen content. Extra care in the surgical procedure and strong suture lines are mandatory.

Both the anti-anabolic and anti-inflammatory effects of glucocorticoids are involved in increased susceptibility to infection. It is particularly important to guard against viral infections. Bacterial infections are best controlled with antimicrobial drugs that are bactericidal because bacteriostatic antimicrobial drugs, including most of the broad spectrum antibiotics, require a more active participation of the host's defense mechanisms. When glucocorticoids are administered in therapeutic dosage, especially for several days or more, host defense mechanisms are impaired and the effectiveness of bacteriostatic antibiotics is seriously compromised.

The side effects characteristic of systemic administration can be minimized by local application of steroids whenever possible. However, surgery should not be done for several weeks on a joint injected with steroid. Another way of minimizing side effects is to reduce the dosage. A current trend in human medicine is to lower dosage in many circumstances. The possibility of achieving the desired effect with the smallest possible dose should be given close attention.

A LARGE ANIMAL CLINIC FOR A MIXED PRACTICE IN THE NORTHEASTERN UNITED STATES

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The development of clinic facilities for large animals has proved to be a wise decision in the management of our mixed practice. Surgical equipment,

drugs, and radiographic darkroom facilities are shared by the small animal hospital and the large animal clinic. The areas for large and small animals are in separate buildings about thirty feet apart but are joined by attractive landscaping.

The large animal clinic includes: a treatment room 21′ × 17′; a feed room 9′ × 8′; a tack room 9′ × 8′; and four box stalls each measuring 10′ × 8′. The treatment room is heated and insulated; the remainder of the area is not winterized.

Convenience and time are perhaps the greatest assets derived from the development of a clinic for large animals. The hospitalization service, particularly for those animals in need of constant and intensive professional care, is of great advantage to both client and veterinarian. Services, particularly those concerned with the diagnosis and treatment of equine lameness, are easily provided. Farriers enjoy working in this type of environment when corrective shoeing techniques are employed. Surgical and radiological procedures are more commonly and more easily performed by using the substantial restraint facilities.

SALMONELLOSIS IN CATTLE

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Clinical bovine salmonellosis occurs sporadically in adult cattle and calves. The disease occasionally attains epizootic proportions suggestive of a common source of infection. A clinical diagnosis of bovine salmonellosis can usually be obtained by observation of clinical signs, examination of herd history and systematic elimination of other causes of bovine enteritis. Clinical diagnosis should be substantiated by isolation of Salmonellae from feces of living animals or from intestine, heart-blood, spleen, lymph nodes or other fresh necropsy specimens. Treatment with antibiotics has been only partially successful.

The immediate source of infection in many outbreaks of bovine salmonellosis is carrier cattle. Despite strong circumstantial evidence that contaminated feed, water or other vehicles are involved, the reservoir and ultimate source of infection of most outbreaks remain unknown.

ACTIVE AND PASSIVE IMMUNIZATION IN FELINE PANLEUKOPENIA

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Queens immune to feline panleukopenia (FPL, infectious feline enteritis, "cat distemper") transfer passive colostral immunity to their newborn kittens. Passive immunity protects the kittens against virulent virus and interferes with inactivated and modified live-virus FPL vaccines. The duration of maternal immunity in kittens depends upon the titer or the immunity possessed by the queen. Kittens from FPL-susceptible queens have no maternal immunity, those from queens with low titers (i.e., vaccinated with inactivated vaccines) have maternal immunity that will last between 4 and 10 weeks. Kittens from queens with high titers (i.e., from active infection or MLV vaccination) have titers that will last between 10 and 16 weeks in most cases.

At present there are 4 general types of commercial vaccines available to immunize cats against FPL.

Type of Vaccine	*Source*	*Virus*	*Virulence*
FT	feline tissue	FPL	formalized
ME	mink tissue	ME	formalized
TC	tissue culture	FPL	formalized
MLV	tissue culture	FPL	attenuated

The FT and ME vaccines tested produced comparable results. A single dose of these vaccines given to susceptible cats produced serum neutralizing (SN) titers between 1/10 and 1/80 in most cases, while a second vaccination increased the titer, occasionally as high as 1/320.

The one TC vaccine tested in this study failed to stimulate a detectable immune response, although reports from producers of other TC vaccines indicate a fairly good immune response.

A single dose of the MLV vaccine produced high SN titers (1/500 to 1/5,000). This vaccine was capable of overcoming low levels of maternal immunity (1/10 or less) while any demonstrable titer interfered with the FT and ME vaccines.

A single injection of commercial FPL antiserum (1 ml/pound) given to susceptible kittens produced passive immunity which interfered with MLV vaccination for 3 but not 4 weeks. It is probable that this passive immunity would have interfered with inactive vaccines for from 4 to 6 weeks.

Tentative recommendations for vaccination of kittens from queens with unknown immune status are as follows. For inactivated vaccines, give 2 vaccinations, one at 8 to 10 weeks of age, and a second at 12 plus weeks of age. For protection of the maximum number of cats, a third vaccination should

be given at 16 weeks of age or older. For the MLV vaccine, give a single vaccination if the cat is 12 weeks old or older. If younger than 12 weeks, give a second vaccination at 12 weeks or older.

FELINE CLINICAL HEMATOLOGY

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Minimal procedures include the capillary hematocrit test for erythrocyte volume, total leukocyte count, and stained blood film for the differential leukocyte count, erythrocyte morphology, thrombocytes, and detection of *Haemobartonella felis*. Either capillary blood from margin of the ear or large vessel blood with EDTA anticoagulant at 2 mg./ml. is satisfactory.

Physiologic leukocytosis due to fright or emotional stress must be distinguished from leukocytosis of disease. It occurs mostly in cats less than a year old, and commonly is characterized by counts of 20,000–30,000 with neutrophils and lymphocytes in nearly equal numbers. Systemic diseases with high fever may be accompanied by leukopenia at all ages. Recovery is followed by appearance of primitive and giant forms of neutrophils in the circulation. These are quickly replaced by cells of more normal morphology so that blood films examined 24 and 48 hours later will differentiate the non-neoplastic condition from leukemia.

The most challenging aspect of feline clinical hematology is diagnosis of the leukemia complex and the closely associated myeloproliferative diseases. Cats have both groups of diseases with considerable frequency.

Occurrence of nucleated erythrocytes in peripheral blood is a common finding in sick cats. Their presence in blood, with or without accompanying anemia, should not be interpreted as indicating intensified erythrogenesis unless polychromasia and anisocytosis are also present. Chronic anemia associated with *H. felis* must be separated from the chronic refractory anemias. The latter is unresponsive to therapy and life is prolonged for a short period only by whole blood transfusions.

CLINICAL AND RADIOGRAPHIC ASPECTS OF "EOSINOPHILIC PANOSTEITIS"

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"Eosinophilic panosteitis," a disease syndrome of unknown cause, was first described in Europe in 1951 and recognized in this country in 1959. The morbidity rate in dogs, particularly the German Shepherd, has been increas-

ing throughout the country since that time. Today, the condition is considered one of the major causes of acute lameness in young dogs. "Eosinophilic panosteitis" is the clinical, not the histologic, term in common use describing the syndrome. Synonyms include juvenile or atypical osteomyelitis and enostosis of young dogs.

The condition is characterized by attacks of acute lameness in dogs ranging in age from 3 to 20 months. These attacks are self-limited, but may last for several days. Most commonly the condition is seen in the German Shepherd and Basset Hound. It has been reported in a number of other breeds including the Doberman pinscher, Golden and Labrador retriever, Great Dane and Saint Bernard.

The acute attacks recur at irregular, unpredictable intervals after periods of apparent recovery. The first attack often appears when the patient is from 3 to 7 months of age. The duration of this and subsequent attacks range from 3 to 15 days, or longer in exceptional cases. Subsequent episodes are seen in from 2 to 12 weeks.

The majority of cases are in male dogs (approximately 80%) with one or more long bones involved simultaneously. If more than one long bone is involved, there is usually an intermittent shifting leg lameness. Severe pain is elicited upon deep palpation of the affected long bones and muscle atrophy often accompanies the acute attack. There is an associated tonsilar hypertrophy, and in 30–50% of the cases there is a relative and absolute peripheral eosinophilia at the time of admission. Often, there is a mild leukocytosis with a shift to the left. Fever may be present and range from high normal to 104 F. The humerus, ulna, radius, femur and tibia are the only bones involved in cases seen so far.

Radiographically, the lesions visualized can be classified as an atypical osteomyelitis. First there is a dense heterogeneous intramedullary infiltration (myelosclerosis) followed by the appearance of a clearly defined, linear periosteal new bone proliferation a few days after the initial attack. Ultimately, there is resorption of the endosteal trabecular and periosteal new bone, such that the affected long bones become radiographically normal.

Recently viral, bacterial (*Corynebacterium striatum*) and hormonal (hyperestrinism) influences have been incriminated. As yet, none of these has been proved to be the cause of this disease entity.

VIRUS INDUCED LEUKEMIA IN THE CAT

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Leukemia viruses morphologically similar to those which produce leukemia in the mouse and chicken also induce leukemia in the cat. Cell-free transmission to newborn kittens has been accomplished repeatedly. Most strains of

cat leukemia virus do not transmit readily in a serial manner in genetically unrelated kittens, although one or two passages can often be achieved. However, one strain of cat leukemia virus has been transmitted through seven serial passages to more than 100 kittens. The experimental disease had a short latent period, usually one to three months but occasionally as long as five months. The gross lesions included generalized lymphadenopathy and a variable degree of splenomegaly. Histologically, the lesions were a malignant lymphoma of mixed cell type, including reticulum cells, histiocytes, lymphatic cells, and a few giant cells. Less frequently the tumor was manifested as a typical lymphosarcoma involving the thymus, peripheral nodes, spleen, and liver.

An extensive viremia was demonstrated in some cases of the experimental disease. Infected kittens could be identified by electron microscopic examination of bone marrow biopsies.

The experimentally transmissible virus was morphologically identical to the virus observed in natural cases of cat leukemia. The virus particles (type C) were approximately 110 mu in diameter and contained a nucleoid approximately 65 mu in diameter. The virus particles were found budding from the surface of neoplastic cells, and occasionally into intracytoplasmic vesicles. They were found in very large numbers budding into the vesicles of megakaryocytes in the bone marrow, and could be found in the platelets in peripheral blood.

Immunological studies by Drs. Hardy and Old at Sloan-Kettering indicate that various strains of cat leukemia virus from both spontaneous cases and from this experimental strain share a common group-specific antigen.

In summary, it is apparent that leukemia in the cat is caused by typical leukemia viruses, and that the feline disease closely resembles the virus-induced leukemias of mice.

CLINICAL RECOGNITION AND TREATMENT OF SHOCK

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The practicing veterinarian, like the medical practitioner, has been bombarded for twenty years with conflicting research data regarding shock, its causes, recognition, and treatment. Fortunately, much of this research has been oriented toward the dog. This paper will deal with those aspects of the pathogenesis, diagnosis and treatment immediately applicable to daily practice.

The practitioner is interested in what occurs and how to correct it, but should have some overall concept of why the changes occur. At the present time, the monitoring of central venous pressure (CVP) can be his most useful tool. Simple inexpensive equipment can be made from hospital odds and ends. Packed cell volume (PCV) and arterial blood pressure (BP) are helpful, but their use is full of unsuspected pitfalls.

Concepts of therapy have changed radically in recent years. Whole blood and hypertonic solutions are often contraindicated. Simple electrolyte solutions, plus common buffers, fulfill the needs of most patients. Dosages are easily calculated and controlled.

Newer drugs, especially Isoproterenol and Dibenzaline, are particularly useful; many of the older stimulants (epinephrine, amphetamine, etc.) are usually contraindicated.

Simple facts to utilize:

PCV – the poorest estimate of blood volume available

BP – A constantly shifting value – by itself meaningless

CVP – A simple, easily obtainable measure of blood volume and cardiac efficiency:

1. Hypovolemia – <5 cm. H_2O
2. Normovolemia – 6–12 cm. H_2O
3. Hypervolemia – >15 cm. H_2O or cardiac failure

Fluid therapy for hypovolemia:

1) Relatively isotomic fluid with pH$\sim$8.2
   Lactated Ringer' solution
   plus – 10 cc. 44 mEq. $NaHCO_3$/liter or 10 cc. 7.5% $NaHCO_3$/liter or 3/4 gm. sod. bicarb $NaHCO_3$/liter
2) Volume to use:
   a. 2.5–4 times estimated blood loss or
   b. volume equal to normal blood volume of patient (8% body wt.) or
   c. sufficient to maintain normal CVP

Additional therapy:

1) Isuprel (Winthrop) – ampules for parenteral use
   5 cc/200 cc fluid – 1 cc/min by IV drip
2) Massive doses of broad spectrum antibiotics
3) Steroids and antihistamines
4) Hyperventilation, tracheotomy, etc.

ANTHELMINTIC USE IN HORSES

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The migrating larvae of strongyles, ascarids, and other equine parasites frequently inflict greater injury than do the reproductive adult parasites that reside in lumen of the alimentary canal. Heavy larval invasions, especially in young highly susceptible horses, frequently prove fatal. Although many currently available anthelmintics are very effective against the lumen dwell-

ing adults, none possesses satisfactory activity against the larvae in tissues. Therefore, prevention of serious injury can only be brought about by limiting the ingestion of infective stages. This may be accomplished by reducing the fecal contamination of the feed by sanitary measures and by reducing the parasite egg content of feces by anthelmintic attack on the adult parasites. A combination of both sanitary and anthelmintic measures works best. All horses on the premises must be included in an effective control program, not so much for the sake of their individual well being, but because each constitutes a source of infection. Year around reduction of environmental contamination with strongyle eggs requires regular administration of thiabendazole or other suitable anthelmintic at 8 week intervals. This interval is chosen because it allows larvae that were migrating at the time of the previous dose to mature and thus become susceptible to anthelmintic action.

ECONOMICS OF MIXED PRACTICE

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The practice of veterinary medicine requires that the veterinarian look at himself both as a professional and as a business manager. This paper was addressed to the "business manager" of the practice who makes the day to day decisions.

The decision-making process needs information, no matter how inadequate. Management information systems are designed to provide feed-back from the results of previous decisions, yielding data which may be of value in future decision making. The cost of information must always be considered when facing a major decision and be weighed against the probable benefits expected.

The veterinary practice manager must: 1) define his objectives or goals, 2) identify the problems related to those objectives, 3) analyze the alternative solutions and 4) make the decision and 5) analyze the results of that decision. The optimum utilization of time, labor and capital must be considered. The veterinary practice manager should identify and maintain records of his major income sources, record the expenses allocated to the production of this income flow, and maintain a record of client numbers per time period. He should be aware of the client queue or waiting time. Currently, attention should be directed toward his accounts receivables due to the record high interest rates being charged for money. Drugs should be cost-marked and an employee should take an accurate total inventory each year.

The practice manager should identify information already available in the practice. The balance sheet or net worth statement consists of the assets, which are how the funds are being *used,* and the liabilities and owner's equity which identify the *sources* of the funds in the practice.

The "income statement" contains information on the gross income and where that income was expended. Compare financial statements which cover like periods of time and identify the major changes. Ask *why* they differ. If you know the answer, your problem is easily solved. If you cannot answer why, further analysis is required.

LAMENESS IN PLEASURE HORSES

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An essential element in the treatment of equine lameness is the search for underlying physical causes, particularly those which are not obvious at first sight. In the speed horse, the interaction of fatigue and faulty conformation is credited with producing most lameness. In the pleasure horse however the effect of fatigue is less important than a sudden shifting of the center of gravity. The shift may result from uneven ground, or from an inexperienced rider upon a horse that is improperly conformed or inadequately conditioned for the task at hand. Strains, with their varying degrees of tissue damage, are thus easily produced.

In the treatment of lameness the important question of proper foot angle may be misunderstood. The main support of the fetlock joint is the suspensory ligament, in conjunction with both flexor tendons. When the heel is raised, either by shoeing or from uneven ground pressure, less tension is placed upon the deep flexor tendon. At this time the fetlock joint sinks and increased strain is added to not only the suspensory ligament but also to the proximal sesamoid bones and the superficial flexor tendon. It is very rare for the deep tendon to be involved in the common "bows" and tendonitis conditions that we see, yet authors describe shoes with raised heels as specific aids for such legs. Actually if we desire to change the height of the heel to aid tendonitis we should lower it. Only by lowering the heel with subsequent tightening of the deep flexor tendon do we straighten the fetlock angle. This will relieve and ease the tension of body weight on the strained superficial flexor tendon. Adjustment of the angles of the foot by rational shoeing can also be of benefit in such conditions as forging, contractions, and the dangerous "fetlock knuckling."

EFFECTS OF SEASON AND SEMINAL PLASMA ON STALLION SPERM

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Semen was collected from four stallions on a regular schedule, and from several more at various times around the year to study the effects of season on the chemical and physiological characteristics of the semen.

There was a sharp decline in the tolerance of the spermatozoa to stresses like unphysiological osmotic pressure changes and freezing. The seminal plasma in general depressed motility, and increased the incidence of clumping of spermatozoa and abnormal movement. In winter this effect was dramatically demonstrated in ejaculates with zero percent motility or anabiosis. When the plasma or the plasma effect was removed, either by removal of plasma or by dilution, the motility improved significantly, clumping was reduced and the spermatozoa exhibited less abnormal movement. The semen with zero percent motility could be revived to the 90 percent level.

Fraction collection of the ejaculate resulted in concentrated and cleaner semen. This method allowed extension of the sperm rich fraction and thus reduced the plasma effect on the spermatozoa.

ASPECTS OF REPRODUCTIVE PATTERNS IN MARES

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There is little evidence that hormones or other pharmacological agents are effective in inducing reproductive activity in anestrous mares. There is evidence, although equivocal, that PMSG may accelerate the transition from anestrus to the breeding season in mares that have entered the transitional period. Treatments with progestogens followed by gonadotrophins, such as have been used to induce estrus in anestrous ewes, were ineffective in mares. Artificially increasing the photoperiod in winter and spring is a practical means of inducing earlier onset of the breeding season.

Interruptions of the estrous cycle during the breeding season are due to various causes. Cyclic patterns may be re-initiated by infusing a volume of saline into the uterus in some instances. Pituitary gonadotrophins have not produced reliable results in bringing about resumption of cycles. PMSG is reported to be effective but results are variable. Estrogen treatment may induce estrus with ovulation when an ovulable follicle is present. The timing and dosage of estrogen may be critical in such instances.

Post-partum estrus and ovulation can be delayed or blocked by progesterone injections. Withdrawal time of progesterone is critical since follicles will fail to ovulate after treatment if the progesterone block is prolonged. Fertility following progesterone-delayed ovulation appears to be normal. Synchronization of estrus in groups of mares is of limited interest. Progesterone appears to be satisfactory for this purpose but synthetic progestogens with a methyl group at 6 carbon atom are inactive in mares.

Preliminary results with a non-hormonal pituitary inhibitor, ICI 33828, were promising.

PARAMEDIAN APPROACH FOR EQUINE CRYPTORCHID CASTRATION

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The paramedian laparotomy approach for castration of abdominal cryptorchid horses has been reported by other authors in 19 animals. The operation has recently been performed at the New York State Veterinary College on 12 additional horses. Except for one case with a surgical wound infection, recovery has been uneventful in all 12.

General anesthesia and aseptic surgical technique is a necessity. Accurate diagnosis of the abdominal cryptorchid condition is also essential, lest the testicle be in the inguinal canal and cannot be returned to the abdomen for removal.

The paramedian approach offers the following advantages over the classical inguinal site: (1) the inguinal canal and peritoneum of the internal inguinal ring are not disturbed, (2) the surgeon can locate the retained testicle more easily, (3) all incised tissue layers can be sutured, (4) first intention healing is expected, (5) the technic is identical for any size horse or pony, (6) a large cystic or teratomatous testicle can be easily removed, and (7) the grave danger of post-operative eventration is reduced to the point of being no greater than it is for an umbilical herniorrhaphy.

PRINCIPLES OF INHALANT ANESTHESIA

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A whole generation of veterinarians has grown up imbued with the pentobarbital approach to anesthesia. Its convenience, ease of administration, and familiarity have bred contempt for its serious shortcomings. The demands of more complicated and longer procedures coupled with the advent of new agents require us to reassess our anesthetic approach and utilize safer and saner methods.

The use of gas anesthesia is only safe when it is based on an understanding of the physical and physiological principles involved. An appreciation of partial pressures, membrane transport, modern theories of anesthesia, redistribution phenomena, and respiratory control are essential to the safe use of these agents.

Gas machines in a wide variety are available but costly. An understanding of the advantages and shortcomings of various types can prevent poor investment. Some types are sold without a clear warning of the built-in dangers. The practitioner, if informed, can suit the equipment to his individual practice situation and tastes.

All preanesthetics, anesthetics and narcotics reduce minute respiratory volume. Assisted ventilation, either mechanical or manual (bagging), is necessary to prevent hypercarbia and respiratory acidosis. However, excessive pressure or rapid rate must be avoided. Intraalveolar pressures over 20 cm. H_2O seriously restrict pulmonary circulation and prevent right heart filling from vena caval return. Expiratory time should be about twice as long as inspiratory time to provide the low pressure period necessary for pulmonary flow and venous return. A slow steady rate (10–12/minute) produces maximal alveolar ventilation while rates over 20/min. actually reduce alveolar ventilation. Well built equipment should provide a "pop off" valve to prevent excessive pressures, but rate must be controlled by a conscientious anesthetist. Even intermittent "bagging," two or three times each minute, is of great help in preventing severe hypercarbia.

Masks increase dead space and airway resistance while proper tracheal catheters reduce resistance and dead space. Masks should never be used except for induction or very short procedures.

Open anesthetic systems, varying from simple paper cones to more complex units utilizing one-way valving, are relatively inexpensive to purchase but expensive to operate. Their use is to be discouraged. The larger investment for suitable closed systems is quickly recovered by savings in anesthetic and oxygen.

Closed systems are available in to-and-fro and in circle models. The to-and-fro type, although simple in concept and operation, contains more mechanical dead space. A unit perfectly satisfactory for a Great Dane can be lethal for a Chihuahua. Circle systems contain less dead space and may be safely used for a wide variety of patient sizes.

Today the veterinarian may choose from a large number of anesthetic gases and volatile liquids. Cyclopropane and ether are too explosive for routine use. Chloroform is too toxic. Nitrous oxide, halothane and methoxyflurane are all excellent agents if the characteristics of each are understood.

Nitrous oxide has many excellent characteristics. It is non-toxic, provides rapid induction and recovery, and has almost no adverse effects on the respiratory or cardiovascular systems. It is, however, a poor analgesic in safe concentrations. Nitrous oxide is usually administered in a mixture with 25–35% oxygen. A two-gas system is required, increasing equipment expense. A nitrous-oxygen mixture for induction followed by one of the more potent agents for anesthesia is a rational system of balanced anesthesia.

Halothane, a potent non-explosive volatile liquid, produces rapid induction and allows for equally rapid recovery. Only calibrated vaporizers should be used and with circle equipment the vaporizer must be outside the circle. A 2–3% concentration is used for induction and 0.5–1.0% for maintenance. Halothane is a potent hypotensive agent and respiratory depressant, especially as deeper anesthetic planes are reached. Anesthetic levels can be

altered almost breath by breath. It should be considered a precision anesthetic for those equipped for precision anesthesia.

Methoxyflurane has many characteristics similar to halothane. It also produces hypotension, respiratory depression, and marked reduction in cardiac output. Some have criticized the slow induction and recovery seen with methoxyflurane anesthesia. This very feature may well afford a safety factor for the average veterinary hospital. In addition, this drug is a potent analgesic. Sufficient analgesia for many procedures is achieved at light planes of anesthesia. The recovery period, although long, is marked by continued analgesia – certainly an additional plus following painful surgery. Vaporization at room temperature is low and standard wick, bubble, or drip vaporizers are adequate for both induction and maintenance.

A very workable general anesthetic routine can be developed using only the following drugs and equipment:

1) Promazine or Chlorpromazine for preanesthetic tranquilizations (0.5–1 mg/#)
2) Thiamylal Na (Surital) for short procedures and for induction for longer procedures (4–5% solution, to effect)
3) Atropine-(average dose 1/125 gr.)—*always* given before intubation—may be mixed with induction dose of Thiamylal
4) A variety of tracheal catheters
5) Halothane-oxygen)
   Methoxyflurane-oxygen) with suitable vaporizer in closed circle system
   Nitrous-halothane-oxygen)
6) Pentobarbital Sodium
   —still of value in convulsive states, and for some routine short elective procedures in animals in excellent health (ear trims, some ovariohysterectomies)
   —as a matter of good habit and safety *always intubate*.

IMPROVEMENT OF RADIOGRAPHIC QUALITY — PART I

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Taking consistently good radiographs requires a working knowledge of how the radiographic image is produced on the film. Therefore, many factors must be considered before the exposure circuit is closed and ionizing radiation produced.

A single radiograph gives little information concerning the relative depth of structures producing the observed shadows. The method most commonly used to show relative depth is two views at right angles to one another. To show structural depth a special procedure, stereoradiography, has to be employed.

Satisfactory pictures can often be obtained without the use of sedatives or general anesthesia, but there are instances where it would be impossible to retain a desirable posture on a conscious dog, such as open mouth views of the skull, hip dysplasia shots, fractures, etc. The decision to employ an anesthetic agent will be at the discretion of the clinician who is in charge of the case. General anesthesia provides the ideal condition for positioning and reduces personnel exposure to radiation.

Standardization of equipment, techniques, processing procedures and positioning will enhance the overall radiographic quality, and contribute greatly to the accuracy of interpretation.

IMPROVEMENT OF RADIOGRAPHIC QUALITY — PART II

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Radiographic screen-type film is primarily exposed by visible light that is emitted by the two intensifying screens in the cassette. The intensity of the light emitted by the screens is a function of the radiation which falls upon them, primarily governed by the following factors:

1. Kilovoltage (KvP.).
2. Focal Film Distance (FFD).
3. Filtration.
4. The type of screen that is used.
5. Secondary radiation.
6. The thickness, opacity and pathology of the part being radiographed.

The duration of time that the light source is emitted is governed by the milliamperage-seconds (MaS.).

Many other factors affect the overall film density. However, their influence is usually considered to be secondary in importance and can be controlled by the radiographer. The following are regarded as secondary factors:

1. Processing.
2. The type film that is used.
3. Poor screen contact.
4. Visible light (other than that emitted by the screen).

It is important to eliminate as many variables as possible when a radiographic examination is to be performed:

Focal Film Distance — Use a standard focal film distance for every examination:

Small Animal	36″ FFD
Large Animal	30″ FFD

Filtration – use a minimum of 2.5 mm. of aluminum port filtration – this will help to eliminate the soft X-rays that serve no useful purpose.

Cones – always use a cone or some other form of beam collimating device. Cones and collimators are extremely helpful in controlling hazardous secondary radiation. Through the use of a beam collimating device there will be an increase in the amount of radiographic contrast. Contrast makes detail more apparent.

Grids – use a grid whenever the part thickness measures more than 10 cm. Grids help to eliminate the secondary radiation, improving the quality of the radiographic image.

Screens – use one type of screens in the cassette:

Small Animal	Par-speed
Large Animal	Hi-speed

DEMONSTRATIONS IN NEUROLOGY

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The location of neurologic lesions can often be determined by the signs presented. Differentiation of the kind and cause of the lesion will depend upon clinical pathologic and radiographic studies and the previous experience of the clinician. Nine case reports of small animals with neurologic disease were presented. Each was accompanied by a film showing the salient signs. Each presentation included differential diagnosis, prognosis and therapy. Five cases involved diseases of the spinal cord, and four concerned various areas of the brain. A detailed description of the nine cases is available upon request from the author.

Case 1 was an unusual form of ascending myelomalacia following an intervertebral disk protrusion between the 12th and 13th thoracic vertebrae. A complete flaccid paralysis ensued in the area supplied by the spinal cord that was undergoing malacia. The destruction was permanent. No treatment is available.

Case 2 exemplified a syndrome not uncommonly seen in aged German Shepherd dogs. They present with a slowly progressive symmetrical paraparesis that eventually becomes a paraplegia. The lesion is a diffuse demyelinating myelopathy of unknown cause located throughout the lumbar, thoracic and occasionally cervical spinal cords. No treatment is known.

Case 3 was a typical case of the neurologic form of distemper encephalomyelitis that presented with signs of spinal cord dysfunction. Lesions were present in the spinal cord, cerebellar white matter, and optic tracts.

Case 4 was a cerebellar disorder recently studied in a group of Kerry Blue Terriers. The signs have an insidious onset around 9 to 12 weeks of age and progress over the next several weeks until the animal cannot walk without falling. The possible hereditary basis for the disease was discussed.

Case 5 was a description of 2 young Great Dane dogs with cervical spondylolisthesis, an excess mobility of the cervical vertebrae, that narrowed the vertebral canal and compressed the spinal cord. The hind legs or all four legs may be involved. The disease remains static or slowly worsens. No recoveries have been noted. The cause is unknown.

Case 6 was a brachial plexus neurofibroma. Characteristic signs began as an obscure lameness of one forelimb. In time the muscles of that limb atrophied, weakness became evident in the hind limb on the same side. The paresis occurred as the neoplasm invaded the vertebral canal and compressed the spinal cord. It terminated in complete tetraplegia of the patient.

Case 7 was a neoplasm in the diencephalon involving the internal capsule and optic tract on the left side. The former caused a slight right spastic hemiparesis, the latter caused a visual deficit in the right eye. As is characteristic of intracranial neoplasms, the cerebrospinal fluid pressure was extremely elevated.

Case 8 was an old traumatic lesion of the left cerebral hemisphere in a cat involving functional systems as in Case 7, and causing the same signs.

Case 9 was a dog that had convulsions and neurologic deficiency suggesting a diffuse lesion of the central nervous system. The lesion was an encephalopathy due to abnormal kidney function. This case points out the importance of examining the other body systems in animals with diffuse neurologic disease.

THE PRACTITIONER AND THE INTENSIVE CARE PATIENT

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Intensive care is becoming a well-known concept in human medicine. It also is a term more and more veterinarians are thinking about as they treat their critically ill patients. A great deal of effort may be expended on the animal patient, but often it is not done under the guidance of an established program.

Intensive care is that extra effort we must exert in nursing, measuring and evaluating physiological changes, and treating according to these evaluations. Particular attention is paid to the thermal regulatory system, the respiratory system and the cardiovascular system.

The thermal regulatory system, via body temperature, dictates the general level of metabolism. Heat is produced by energy reactions and it is dissipated or retained by vascular and cutaneous mechanisms. In the critically ill we must retain or carefully supplement body heat because the usual mechanisms for doing so are defective.

The respiratory system must be examined by the quality and quantity of the breathing, with special emphasis on rate. The use of an endotracheal tube on all semiconscious or unconscious animals is advisable. Overzealous treatment can be harmful; one should attempt to correct abnormality, but overtreatment is to be avoided.

Most intensive care efforts are concerned with the cardiovascular system.

Perfusion of tissues and organs is obviously necessary to sustain life. The cardiovascular functions we monitor are heart rate (by means of the ECG or auscultation); blood pressure (by feeling the pulse); perfusion of the mucous membranes (by digital blanching); organ perfusion (by measuring urine production); and laboratory tests to determine the quantity of certain blood components.

Treatment should be based on the above and hospital personnel should be trained to estimate important functions as a routine matter. Iatrogenic problems can be largely avoided if the surgical patient is examined closely before surgery and then followed closely afterwards.

THE DIAGNOSTIC USE OF RADIOISOTOPES

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Veterinary medicine has lagged behind human medicine in the application of radioisotopes to diagnostic problems. However, advances are being made in the veterinary field and it is hoped that this trend will continue.

Perhaps the organ most available for diagnostic study using radioisotopes is the thyroid gland, and a number of tests have been developed to aid in the determination of thyroid status. The thyroid uptake of radioiodine (RITU) and the protein bound iodine conversion ratio ($PB^{131}ICR$) tests are in vivo techniques which give an indirect indication of thyroid function. The T-3 and T-4 tests are in vitro tests which require only a serum sample for the determination to be made. The T-4 test is undoubtedly the best indicator of thyroid function since it allows the determination of blood levels of thyroxine. For the dog, normal values of total serum thyroxine are 2.10–6.50 μgms/100 ml.

Another diagnostic problem that radioisotopes can help to solve is the differentiation between malabsorption syndrome and pancreatic dysfunction. Labeled oleic acid, a fatty acid, will be absorbed in the absence of pancreatic enzymes but will not be absorbed if the fat malabsorption syndrome is present. Labeled triolein, a neutral fat, will not be absorbed in either of the above cases. Normal absorption of both substances is about 10–15% in the dog.

The radioisotope renogram, a test involving monitoring the removal of a labeled substance from the blood by the kidney, allows the determination of the functional capacity of each kidney independently.

Isotope dilution techniques can be used to determine the volume of various body compartments e.g. red blood cell or plasma volume. Such determinations aid in the diagnosis of a number of abnormalities such as polycythemia.

Organ scanning techniques allow the visualization of the size, shape, and location of an organ by providing a "picture" of the distribution within an organ of an isotope or isotopically labeled compound that is concentrated specifically by that organ. Such "scans" can also indicate the presence of

non-functional regions since these areas will not take up the isotope and will appear as "holes" in the scan.

Bone scanning, very different from organ scanning, is a relatively new technique which allows a rather precise determination of the amount of mineral in bone *in vivo*. Mineral content is determined by precisely measuring the degree of absorption of a monochromatic X-ray beam as the beam source is passed through a bone. This method shows great promise as a diagnostic tool in a number of disorders of bone and calcium metabolism.

NEW TECHNIQUES IN VETERINARY RADIOLOGY

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New techniques in veterinary radiology are, for the most part, modified applications of procedures currently employed with human patients. The procedures illustrated and discussed were once considered very specialized but now are employed on a routine basis. These special types of radiologic examinations will become more routine in veterinary radiology as the diagnostic benefits become more widely appreciated.

Fluoroscopy, once popular in veterinary practice, has been discarded because of the radiation hazard to the operators. Present fluoroscopic techniques have been greatly improved by electronic means: image amplification, television viewing and video tape recording. The radiation hazard has been appreciably reduced and the resultant information greatly increased in value.

Fluoroscopy has improved our understanding of the dynamics of certain pathological processes, especially in regard to the digestive and respiratory systems. The fluoroscope permits accurate placement of catheters in selected sites of the cardiovascular system or bronchial tree. Image amplified fluoroscopy has also been of great help for proper placement and observation of contrast media within the nervous system.

Tomography, another routine procedure in human radiography, has distinct application in the veterinary field. This technique permits display of specific planes of the living patient, and improves visualization of deeply situated lesions.

RATIONAL USE OF FLUID THERAPY

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Several aspects of fluid therapy are important to the welfare, if not the actual survival, of the patient. The quantity and composition of fluid administered, the rate, route and frequency of administration are all deserving

of careful attention. Of all of these options, the one causing the most confusion is the selection of the best kind of fluid.

Fortunately, in the majority of patients the duration of treatment is so short and the quantity given is so small that failure to use the ideal fluid may not jeopardize recovery. In other cases, the administration of the wrong kind of fluid can aggravate the patient's condition seriously. In these, the selection of the optimal fluid is clearly essential to rapid recovery.

In selecting a solution, one should seek to complement the body fluid of the patient; the solution should have high concentrations of the substance in which the patient is deficient and be devoid of the substances which are in abnormally high concentration. The items of special interest are the principal body electrolytes: sodium, potassium, chloride, and bicarbonate. It is essential to know, for any fluid used, whether the concentration of these ions is less than, equal to, or greater than, the corresponding concentration in plasma. In addition, one must estimate the electrolyte concentrations in the body fluids of the patient. This can best be done by measuring the serum concentrations of the four important ions. When this cannot be done one must evaluate the patient based upon an understanding of pathologic physiology. For example, it is known that in shock, diabetes mellitus, severe diarrhea, or in uremia there is acidosis because of low bicarbonate levels. In these instances, one should choose an alkalinizing fluid, i.e., one with high concentrations of bicarbonate or other bicarbonate-yielding organic anions such as lactate or acetate.

THE UTERUS AND OVARIES OF CATTLE — A REVIEW OF NORMAL AND ABNORMAL GROSS ANATOMY

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A. *Cyclic variations in the ovaries detected by rectal palpation.*

Estrus — Thin-walled follicle, 3/4" in diameter. Early in estrus the follicle is quite firm but becomes soft as time of ovulation approaches.

Three to five days post estrus. Corpus luteum is developing but it is easily overlooked up to 3 days.

Eight to fourteen days post estrus. Corpus luteum reaches maximum size. Consistency is firm but resilient.

Seventeen to nineteen days post estrus. Corpus luteum regressing and new follicle developing.

B. *Postpartum changes in the reproductive organs.*

The corpus luteum of pregnancy starts to regress prior to parturition and undergoes rapid regression subsequently. The CL of pregnancy is never retained. Ovulation frequently occurs within 10 to 15 days after parturition

and some cows ovulate twice by 30 days postpartum. The size of the uterus decreases slowly during the first 4 to 9 days. From 10 to 14 days there is a more rapid decrease. By 25 to 30 days the uterus approaches its non-pregnant size. Uterine involution and ovarian activity are delayed in cows with postpartum diseases such as milk fever, dystocia, and retained placenta. Cows should be examined by at least 30 days postpartum to determine whether the uterus has involuted normally.

C. *Uterine pathology.*

1. Pyometra is usually a postpartum disease; severe cases can be prevented by early treatment.
2. Lacerations which occur during parturition are usually in the ventral part of the body of the uterus. Occasionally, mycotic infections and rupture follow.
3. Mucometra is usually associated with cystic ovaries of long standing.
4. Carcinoma of the uterus is characterized by the presence of hard, umbilicated lesions.
5. Lugol's solution induces necrosis of the superficial 2 to 3 millimeters of the endometrium.
6. Cervical malformations should be considered in heifers which fail to conceive. Heifers with a very tortuous cervical canal, dilatation of the canal or dorsal diverticuli usually fail to conceive. Some will conceive if the cervical canal is bypassed by inserting an insemination pipette through the vaginal wall and depositing semen in the vicinity of the ovary containing a large follicle.
7. Large abscesses may develop in the dorsal wall of the uterine body if an insemination pipette or some other instrument is inadvertently forced into the wall.
8. Lymphomatosis frequently involves the uterus.

D. *Pregnancy diagnosis.*

The amniotic vesicle should not be palpated early in pregnancy because of the possibility of rupturing the embryonic heart which is poorly protected up to 40 days of gestation.

Frequently, the placenta fails to develop in the nongravid uterine horn, and may cause confusion in pregnancy diagnosis.

BOVINE ABORTION — A DIAGNOSTIC PROBLEM

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One of the major economic losses in the cattle business is abortion. Brucellosis, vibriosis and trichomoniasis are virtually nonexistent in the Northeastern United States, yet bovine abortion plagues many herds. About 20% of the recognized abortions are diagnosed. Undetected early embryonic death would lower this percentage if it were included in the statistics.

Mycotic and leptospiral abortions are easily recognized. *Listeria monocytogenes* can cause bovine abortion, but may be difficult to isolate. Infectious bovine rhinotracheitis virus and psittacosis-lymphogranuloma venereum virus include abortion as part of their disease complex. Bovine virus diarrhea, myxovirus parainfluenza type 3 and mycoplasma organism are under suspicion as causal agents, but are difficult to diagnose because of their insidious manifestations, confusing serology, difficult and costly isolation.

About 20% of the aborted fetuses contain common organisms in pure culture (Streptococcus spp., enterococcus, Corynebacterium, yeast, etc.) which may or may not be primary causal agents. Little is known about abortion due to hormone inbalances, poisons and poisonous plants, drugs, toxemias, nutritional deficiencies, hereditary and genetic causes, immune reactions and their possible interplays and combinations. Most have been incriminated by circumstantial evidence only.

Excellent herd health records must be kept so that disease syndromes that may include bovine abortion will be recognized, Thorough sampling is essential, and carefully collected specimens must be sent to a laboratory for diagnosis. Researchers must examine the effects of potential causal agents in the various stages of pregnancy. Inexpensive diagnostic tests and preventive methods are sorely needed. Bovine abortion will remain a costly problem until the above are accomplished.

SAFETY AND QUALITY IN EQUINE RADIOGRAPHY

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Radiation safety and radiographic quality should complement one another in the practice of large animal radiography. When the proper safety devices are employed as an integral part of the X-ray set up, the benefits will be two-fold:

1. Reduction in personal exposure.
2. Improvement of radiographic quality.

The safety devices that should be used include the following: Leaded apron and gloves (at least 0.5 mm. lead equivalent), cones or other beam collimating devices, a minimum of 2.5 mm. of aluminum filtration, Hi-speed screens and a cassette holder at least 4 feet long. All of these devices are inexpensive and practical to use.

In addition to the above, every individual involved in the radiographic examination should be provided with a film badge or some other form of radiation monitoring device. Records of all occupational exposure to radiation received by veterinarians and their assisting personnel must be maintained.

Radiographic quality will be improved if the following rules are strictly adhered to:

1. Always measure the focal film distance (FFD).
2. Use one type of screens in all of the cassettes.
3. Check the timer for accuracy – make four identical exposures of a step wedge or bone on one film; after processing, all four exposures should be identical.
4. Check the machine prior to starting the examination to make sure it will deliver the desired amount of kilovoltage (KvP.) and milliamperage (Ma.). Inadequate wiring may cause surges or drops in the incoming line voltage.
5. Process the film in fresh solutions and follow the time-temperature procedures recommended by the film manufacturer.

RECENT DEVELOPMENTS FOR PROCESSING RADIOGRAPHS IN THE FIELD

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A major problem facing the practitioner who radiographs his patient away from his base of operation is film processing. If it were possible for him to have these films processed immediately after the exposures were made, it would enable him to decide if the examination was adequate. His tentative diagnosis could be confirmed or rejected, a prognosis given and therapy instituted. It is obvious that return trips for reexaminations are impractical, and the transport of many cassettes for making multiple exposures to insure proper coverage is undesirable.

Portable darkroom facilities would be an ideal solution to this problem but impractical unless the practitioner has some sort of van. Immediate film processing has been an important factor in human orthopedic surgery and special processes were developed to fill this need. Two currently available systems, the POLAROID and the ANSCO SPEED – X"R", were presented with examples of the film quality obtained and a demonstration of operating characteristics. These systems have certain drawbacks such as high cost, minimal film quality and difficult portability. With the rapid recent advances in high temperature film processing these systems may very well provide the solution to the problem in the very near future.

EQUINE RADIOGRAPHIC CHANGES FROM THE VIEWPOINT OF THE RADIOLOGIST

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Abnormalities observed in radiographs represent the response of the patient, the sum total of his reactions in the pathological process. Two obvious exceptions to this are fractures and foreign objects. It is from this demonstrable response that the nature of the lesion or its initiating factors can often be inferred. An increase in volume of soft tissue might indicate vascular engorgement, edema, hemorrhage or neoplasia. Productive bone changes peripheral to a joint could be the visible response to an invisible cartilage lesion. Mineralization within soft tissue may represent the precipitation of calcium into an old hematoma, necrotic cartilaginous or fibrous tissue, and so on.

Interpretation is the word which best expresses the procedure of correlating the findings and forming an opinion. After first recognizing the abnormality, an identification of the change must be followed by a consideration of the possible or probable local causes of the change. At this stage coordination of radiographic and clinical findings should limit the interpretation to one or two possibilities.

It should be obvious that the radiographic information collected must be reliable if it is to be used in such decision making processes. Thus, it is necessary that proper techniques be employed.

DIAGNOSTIC AIDS IN LAMENESS

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1. An accurate history allows classification of cases into acute lameness and chronic lameness.
2. Definitive examination should begin at the foot (90 percent of lameness-producing lesions are between knee or hock and the ground level).
   Required equipment includes educated anatomic fingers, hoof testers, materials for nerve or articular blocks and a radiography unit.

3. General characteristics of acute cases are:
   a. Pain is local, general, or both. Local pain may be elicited by pressure, percussion, flexion, extension, torsion.
   b. Heat is detected by hand, particularly by drying rate and comparison with the normal leg.
   c. Swelling is usually associated with pitting edema. Fibrosis appears in the subacute cases.
   d. Altered function is seen as uneveness of gait. The abnormality may be very confusing in bilateral lameness, and may become complicated by secondary low-grade myositis.
4. General characteristics of chronic cases are:
   a. Pain is manifested primarily as the result of a definite stress. Arthritics become limber with light exercise, but worsen perceptibly with hard work. Local pain is usually not so intense as in acute cases.
   b. Heat is variable, often not present.
   c. Swelling is usually the fibrotic type.
   d. Altered function may be accompanied by ipsilateral muscle atrophy, contralateral (or diagonal) hypertrophy, or contralateral secondary lameness.

HISTORY TAKING AND PHYSICAL EXAMINATION IN SMALL ANIMALS

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Few aspects of veterinary medicine require more complete knowledge of the diseases of the particular species involved than the taking of a good history. Too often what history is taken is obtained by lay personnel who are really not capable of extracting adequate information. It is essential that the veterinarian be sure that he is communicating effectively with his client. In many instances wrong impressions are gained by imprecise use of terms by the client. The veterinarian must be aware of such potential failures in communication and ask the client to describe what he observed, rather than to relate the conclusions he made from his observations.

While there are many satisfactory ways of performing a physical examination, it is important that every veterinarian develop a systematic approach and use this approach consistently. It is only with such thoroughness that errors of omission will be minimized. A routine physical examination is not time consuming and should be performed on all patients. One useful tech-

nique is to postpone until last the examination of the area of the body most likely affected as judged by the history. One can avoid becoming so absorbed in this problem that he misses findings of major consequence.

GASTROINTESTINAL RADIOGRAPHY

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The anatomic elements of the gastrointestinal tract were considered individually. The discussion of each included normal radiographic appearance, methods for enhancing visualization, and radiographic differential diagnosis.

Organ	*Contrast Medium*	*Differential Diagnosis*
Esophagus	Barium sulfate paste (orally, or in food)	Achalasia, chalasia, stenosis, esophagobronchial fistula, gastric eversion, foreign body, esophagitis, tumors (especially with Spirocerca).
Stomach	Barium sulfate suspension (by tube in empty stomach), air, organic iodine solution	Foreign body, acute dilation, gastritis, pylorospasm, tumors.
Small Intestine	Barium sulfate suspension (tract empty, administration timed)	Meckel's diverticulum, foreign body, perforation, ischemic necrosis, intussusception, adhesions, enteritis, tumors.
Cecum	Barium sulfate enema	Gas accumulation as in trichuriasis, amoebiasis; gaseous distention associated with impaction, peritonitis.
Colon	Barium sulfate suspension, air, or combination of both (empty tract is prerequisite for rectal infusion)	Megacolon, other obstipations (IV disc, tumors, prostatitis), diverticula, herniation, intussusception, volvulus, tumors (rare), colitis.

SURGICAL TECHNIQUES IN OPHTHALMOLOGY

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The purpose of this seminar was to present some of the basic surgical techniques which one may use in treating ocular conditions of small animals. Highly specialized surgical techniques and intraocular surgery have been excluded.

Traumatic Proptosis: Proptosis of the eye is more common in the brachycephalic than non-brachycephalic breed of dog. In the non-brachycephalic breeds a greater force is needed to initiate proptosis and this usually results in more severe intraocular damage than in brachycephalics. Immediate considerations in replacement of the proptosed globe must include assessment of the general physical state of the animal and especially the central nervous system. Treatment of venous stasis of the eye and resultant swelling of the globe, prevention of drying of the globe, replacement of the eye, and finally awareness and treatment of sequellae such as iritis, chorioretinitis, retinal detachment, and avulsion of the optic nerve are all important factors.

Muscle injury with resultant strabismus may occur as a complication of proptosis. Over a period of two to three months, return of the eye to the normal visual axis usually occurs.

Nasolacrimal system: The nasolacrimal puncta are located on the inner aspect of the medial canthus at the muco-cutaneous junction, and are connected to the lacrimal sac by two canaliculi. The patency of the excretory system can be determined by the use of topical fluorescein. A blunt needle is first inserted into the upper punctum and its patency tested by observing fluorescein coming through the lower punctum. The procedure is then reversed. Nasal patency is tested by placing the needle into the upper punctum, holding the lower punctum closed with finger pressure and observing flow through the nose.

The nasolacrimal system may be blocked at the punctum, the lacrimal canaliculi, the lacrimal sac or more distally. Imperforate lower nasal puncta is a congenital defect that may be found in all species but is more frequent in poodles and Bedlington Terriers. Accurate incision or excision of a small eliptical area over the lower puncta will create a new artificial puncta. Epiphora in poodles may be due to a defect in the puncta, however there is more often a shallow lacrimal "lake" allowing for overflow of a normal amount of tears.

Conjunctival Flap: Conjunctival flaps are indicated in corneal ulcers which are not healing under medical therapy or are in danger of perforation. They are also indicated in acute traumatic injury or laceration on the cornea.

To create a 360 degree conjunctival flap the limbal conjunctiva is held with forceps, and a small incision is made and enlarged with scissors. The conjunctival flap is pulled over the corneal surafce and sutured to it with a 4–0 silk in a mattress pattern. The location of the corneal defect will determine how much conjunctiva should be undermined dorsally and ventrally. A complete 360 degree conjunctival flap may not be necessary. Sutures should not be placed directly over the corneal defect but rather above or below the defect.

Nictitating Membrane Flap: A nictitating membrane flap may be used in place of a conjunctival flap but this procedure is not as effective since it does not produce an adhesion or cause sufficient vascularization of the wound. A conjunctival flap is much preferred over a nictitating membrane flap when perforation is present or imminent.

Retrobulbar Injections: The retrobulbar or orbital site is used primarily for infiltration anesthesia prior to ocular and orbital surgery. Retrobulbar injections may also be used in treating traumatic proptosis and optic neuritis. Retrobulbar anesthesia blocks the ophthalmic division of the trigeminal nerve, the oculomotor, abducens and trochlear nerves.

In dogs a 3–4 cm. 20 gauge needle with a short bevel is inserted into the caudal angle formed by the junction of the lateral orbital ligament and zygomatic arch. The needle is directed slightly caudal and medial so that it contacts the caudomedial orbital wall. The needle is then slightly retracted and 3–8 ml. of local anesthetic may be deposited.

Subconjuctival Injection: This type of injection is indicated when high levels of intraocular drugs are needed within a short period of time and frequent topical applications of drugs are impractical. Conditions such as anterior uveitis, episcleritis, pannus and panophthalmitis may be benefitted by subconjunctival injection. Subconjunctival injection is usually well tolerated if the material injected is nonirritating, relatively isotonic and given in small volumes (usually between 0.1 and 1.0 cc.).

Entropion is a deformity of the eyelid such that the lid rolls inward. Either a portion or all of the eyelid may be affected. In poodles, the medial lower lid is usually affected; in Chows the entire lid margin may be affected while in St. Bernards and bulldogs there is usually entropion of the nasal upper and lower lid and the temporal lower lid. The three most common types of entropion encountered are *congenital* entropion as seen in the "spitz" and Chow Chow, *spastic* entropion as typified by the St. Bernard; and *cicatricial* which may be seen in any breed.

In spastic entropion, corneal disease may be severe and it is sometimes difficult to tell which lesion came first. Spastic entropion can be diagnosed by utilizing topical anesthesia and/or an auriculopalpebral block.

Ectropion: In ectropion the margin of the eyelid is turned outward. Ectropion may be *congenital* as seen in the Bloodhound; *associated with entropion* as seen in the St. Bernard; *cicatricial* or *senile* in origin with a loss of tone of the orbicularis muscle.

NEWER ORTHOPEDIC EQUIPMENT FOR THE SMALL ANIMAL SURGEON

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A technique for the management of certain fractures of the long bones in the dog and cat involves a device to create compression of the bone ends at the fracture site. This approach to fracture fixation can mean earlier ambulation, can often avoid the need for external fixation, and can provide an improved method for handling of non-union fractures in long bones. However, compression-fixation is not intended for the routine treatment of fractures in animals, and must be applied only where specific indications exist.

CANINE ARTIFICIAL INSEMINATION

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A practical, well-tested procedure for artificial insemination in the dog has been developed. Methods for the detection of estrus, the collection of semen, and insemination were described. Observation of the bitch in the presence of the stud is most successful way to determine estrus; vaginal smears are the most accurate alternative method. Semen collection involves digital manipulation, and the insemination technique utilizes only a syringe and inseminating pipet. Feathering the vagina for two minutes after insemination with the hind legs elevated appears to be contributory. The current status of artificial breeding with fresh, stored and frozen semen was discussed. The potential importance of an intra-uterine capacitation period for the sperm prior to fertilization was also mentioned.

THE USE OF PLASTER OF PARIS CASTS IN SMALL ANIMAL ORTHOPEDICS

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With the development of internal fixation the use of plaster of paris casts for fracture fixation has lost popularity. The method if used properly produces favorable results in fractures below the stifle and elbow. Casts are also

valuable postoperatively to support unstable fracture repairs, arthrodesis, luxations, osteomyelitis, tenorrhaphy and to protect surgical sites.

Casts are inexpensive, strong, easy and quick to apply, produce rigid immobilization, are comfortable and cause few complications. Disadvantages are the lack of direct control of fracture segments and the impairment of ambulation.

When applying casts certain principles must be observed. These are:

1. Immobilize the joint above and the joint below the fracture.
2. Cast to the end of the foot.
3. Do not pad under casts.
4. Mold to the contour of the limb utilizing the four natural compression points.
5. When casting fractures of the distal radius and ulna rotate the paw caudomedially.
6. Apply plaster snugly but not tightly.
7. Check casts regularly for warmth.
8. Protect from moisture and external damage.
9. Remove in three to six weeks.
10. Consider swelling, growth and atrophy during the casting and post-casting period.

Plaster can be applied by the spiral or the longitudinal method. Spiral casts are more rigid and are easy to apply but longitudinal casts allow for easy adjustments and observation of accompanying soft tissue wounds.

SYMPOSIUM — MANAGEMENT OF BROOD MARES AND FOALS

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The mare, and to a less extent the stallion, is a seasonal breeder with peak fertility in June and July with slightly lower levels in May and August. Early in the spring the estrous periods are characterized by prolonged and erratic heats as a result of anovulation. Because it is considered desirable to breed mares during this erratic period it is necessary to have a well organized system for estimating ovulation time so that unnecessary covers are avoided.

In preparation for the breeding season at Hanover Shoe Farms all barren and maiden mares are given a thorough physical and genital examination, and corrective procedures are instituted as necessary. Barren mares must yield 2 sterile cervical cultures before being bred. Teasing 3 times a week is begun in January.

During the breeding season, which commences on February 15, all open mares are teased 3 times a week. All mares showing to the horse are palpated rectally to determine if they are close to ovulation. Anestrus mares are checked rectally to determine if they are having silent heats. Ovaries are palpated with particular attention paid to the follicles. Follicle turgidity rather than size is used to predict the number of days to ovulation. Rate of follicular maturation and duration of heat are related to each other and vary with the season.

The cervix is palpated, not examined with the speculum. In a normal estrous cycle follicular maturation and cervical relaxation coincide. Unless the two develop together conception will not be optimal.

In the breeding shed the external genitalia of both mare and stallion are washed with mild soap and rinsed thoroughly. If more than one mare is to be bred to a particular stallion his cover is made with a condom. The semen is divided evenly between the mares, and is inseminated without extender into the uterus.

The advancing season and all that goes with it seems to be the one best treatment for many breeding problems. Antibiotic treatment for suspected endometritis seems most successful when prolonged and intense. Hormones seem to be indicated in only a very few conditions.

A PATHOLOGIST LOOKS AT THE BOVINE RESPIRATORY DISEASE COMPLEX

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A brief outline of the common inflammatory lesions of the lungs of cattle is as follows:

Lesion	*Anatomic Distribution*
Embolic pneumonia (hematogenous)	Scattered, all lobes
Verminous pneumonia (Dictyocaulus)	Dorsal diaphragmatic lobes
Inhalation pneumonia (aspiration of foreign material)	Anteroventral region
Fibrinous pneumonia (Pasteurella sp., as in H.S. or shipping fever)	Anteroventral region
Calf pneumonia (ezootic)	Anteroventral region
Chronic bronchopneumonia	Anteroventral region
Proliferative pneumonia	Diffuse, all lobes
Verminous proliferative pneumonia	Diffuse, all lobes
Bronchiolitis obliterans	Diffuse, all lobes

Inhalation pneumonia is found with particular frequency in calves with white muscle disease, probably associated with difficulty in swallowing. The Pasteurella pneumonia is a very severe lesion and is highly contagious.

The last three pneumonias listed above are poorly described and are not widely known. They have the following characteristics:

Lesion	*Morbidity*	*Mortality*	*Predisposing Factors*	*Treatment*
Proliferative Pneumonia	Low	High	–	Large doses of Atropine: 1 Gm/cow on 1st day; ½ Gm/cow for 2 subsequent days.
Verminous Proliferative Pneumonia	High (95%)	High	Ingestion of pig manure	
Bronchiolitis Obliterans	High (in winter)	Low	Ingestion of old hay or silage	Cortisone

Abstracts were not submitted for the following presentations:

The Lost Art of Physical Diagnosis ..... *Francis H. Fox*

Herd Approach to Examination and Treatment for Bovine Infertility ..... *Richard C. Bartholomew*

Medical Photography ..... *John F. Brock*

Equine Parasites and Gross Parasitic Lesions ..... *Jay R. Georgi*

Equine Necropsy Procedures ..... *John M. King*

Diagnostic Aspects in Dermatologic Disease ..... *Robert W. Kirk*

Bovine Necropsy Procedures ..... *Lennart P. Krook*

Small Animal Necropsy Procedures ..... *Lennart P. Krook*