

Diagnosis of Pregnancy and Infertility By Rectal Palpation

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The successful diagnosis and treatment of reproductive disorders in cattle depend largely on the veterinarian's proficiency in rectal palpation. The purpose of this paper is to briefly describe the techniques, palpable characteristics, and applications of rectal palpation in a fertility program.

Because accurate diagnosis depends so much on the examiner's tactile sense, I firmly believe that palpation must be done with a sleeve that fits well, that is, does not wrinkle, fit too tightly or loosely, and is as thin as possible. The commercial plastic disposable sleeves, in my opinion, are not adequate unless the fingers are removed and covered with a surgical glove. The thin rubber gloves on the commercial rubber sleeves are easily replaced with surgical gloves that fit each individual.

Techniques

Although any fertility examination must begin with a visual inspection of the cow, this discussion will focus on examination of the genital tract by rectal palpation. The first step to rectal palpation involves passing the hand through the anal sphincter. Lubrication and "coning" the fingers makes this quite easy to accomplish. Next the feces are removed from the rectum to the circular fold at the anterior of the ampullae recti (the first peristaltic ring). Removal of the feces often cause aspiration of air into the rectum and "ballooning" of the organ. The air can be expelled by grasping the most posterior contracted peristaltic ring and gently pulling it posteriorly. Attempts at manipulation through an inflated or feces full rectum will result in trauma to the rectum and inaccurate diagnosis. Adequate lubrication, care and patience will reduce these problems.

A systematic approach to examination of the genital organs must be followed to avoid errors. The steps to be followed are:

1. Location and examination of the cervix
2. Examination of the entire uterus
3. Examination of the ovaries
4. Examination of other structures such as the ovarian bursa, oviducts, etc.

Examination of the Cervix

In normal, non-pregnant cows, the cervix is usually found in the pelvic cavity and is freely movable. The cervix is firm, cylindrical, about 7-10cm (3-4 in) long, 3-4 cm (1-1.5 in) wide, and lies on the midline near the brim of the pelvis. It is located by "sweeping" the brim of the pelvis with slightly bent fingers. When it is located, the cervix should be examined for size, shape, and movability. An enlarged, misshapen cervix, one that is hanging over the pelvic brim or not freely movable suggests pregnancy or pathologic conditions of the genital tract. If the cervix is not freely movable the rest of the tract must be examined in its abdominal position. When the cervix is freely movable the next step involves retraction and examination of the uterus.

When the cervix is identified, examined, and found to be moveable, retraction of the uterus should be attempted. The uterus can be retracted in nearly all cows with the following exceptions: cows pregnant more than 7-80 days, with more than 2 liters of fluid in the horns, with mummies or fetal macerations, with extensive uterine adhesions or large ovarian tumors. The uterus of cows more than 2 weeks postpartum should be retractable if involution is progressing normally.

Retraction of the Uterus

Retraction of the uterus involves grasping the cervix and lifting it caudally and laterally, fixing caudo-laterally with the thumb under the body, hooking the fingers under the broad ligament near the tip of the uterine horn, rotating the fingers medially until the uterine horn lies in the palm of the hand, grasping the ventral intercornual ligament with the fingers and reflecting the uterine horns into the pelvic cavity (1). In the retracted position the uterine horns can be examined throughout their entire length and the determination of pregnancy, normalcy, or pathologic conditions can be made with confidence.

Examination of the Uterus

The first consideration in genital examination is whether or not the cow is pregnant. Pregnancies greater than forty days can often be diagnosed without retracting the uterus,

however, a diagnosis of non-pregnant must never be made unless the entire length of both horns is examined. This is usually not possible without retracting the uterus. If a diagnosis of pregnancy is not made, thorough palpation of the uterus supplies valuable information regarding the reproductive status of the cow. Examination of the uterus should always precede examination of the ovaries. It is not uncommon for cows with grossly abnormal ovaries to be pregnant.

Pregnancy Examination

In pregnancy examinations there are four positive signs of pregnancy:

1. Amniotic vesicle—palpable from 28-60 days
2. Fetal membrane slip-30 days to term
3. Cotyledons-65-70 days to term
4. Fetus-60 days to term

These positive signs of pregnancy will be preceded by and accompanied by asymmetry between the horns, fluid and fluctuation in the pregnant horn, and thinning of the uterine wall. These and any other sign such as fremitus of the middle uterine artery, position or size change of the uterus are only suggestive of pregnancy.

A summary of the palpable characteristics of various stages of pregnancy is present in Table I. Several abnormalities of gestation may be detected by rectal palpation. If death of a fetus occurs prior to 42 days of gestation, the fetus and membranes will usually be resorbed. Prenatal deaths after 42 days of gestation may result in unobserved abortions and returns to estrus, observed abortions, fetal mummification, and fetal macerations. Hydropic conditions can be diagnosed by rectal palpation (Table II).

Once a diagnosis of non-pregnant has been made, the uterus should be palpated to establish the presence or

TABLE I
ESTIMATION OF THE STAGE OF GESTATION IN THE BOVINE^{1,2,3}

Days of Gest	Diameter of Preg Horn	Fetal Membranes	Length of Amniotic Vesicle or Fetus	Size of Cotyledons	Position of Uterus		Diameter of Middle Uterine Artery	Remarks
30	Very Slight Enlargement at Ovarian End	In Preg Horn Only; Feel CT Band	.8 - 1 cm	None	Pelvic in Beef Hfrs	Abdominal in Most Dairy	.4 - .6 cm	Uterus must be retracted to diagnose pregnancy at this stage; fluctuant
35	2.5 - 3 cm 1 in	Distinct	1 - 1.5 cm					Fluid in Preg horn; "tone," water balloon feeling
42	4 - 6 cm 2 in	Present in Both Horns	2 - 3 cm 1 in					Amniotic vesicle is firm; bean shaped
50	5 - 7 cm 2 - 3 in		4 - 6 cm 2 in					Amniotic vesicle begins to soften; less distinct
60	6 - 9 cm 2½ - 3½ in		Mouse 8 cm, 2.5 in					Amniotic vesicle very soft; can palpate mouse-like fetus
70	8 - 12 cm 4 - 5 in		3 in	.1 - .5 cm Pea-sized			.5 - .7 cm	Fetus palpable; may detect cotyledons at this stage
80	10 - 14 cm 4 - 6 in		4 in	.5 - 1 cm	Descent into Abdomen Begins		Fremitus Begins	Cotyledons palpable
90	12 - 16 cm 5 - 7 in		Small Rat 5 in	1.5 x 1 cm Dime-sized	Descending		Pencil Sized	Uterus difficult to retract
105	14 - 20 cm 8 in		8 in	2 x 1.25 cm Nickel-sized			.6 - .8 cm	
120	Very Difficult to Determine		Small Cat 10 in	2.5 x 1.5 cm Quarter-sized			.7 - .9 cm	Can palpate fetus 50-100% of the time
150			Cat 14 in	3 x 2 cm ½ Dollar-sized			.7 - .9 cm	Palpate fetus 30-50% of time; may be out of reach
180			Small Dog 22 in	4 x 5 cm and Larger			.8 - .9 cm	Fetus often out of reach in dairy and large beef cows
210			Med Dog 24 - 32 in		Ascent Begins		.8 - 1 cm	Fetus begins ascent due to growth; palpable in beef and some dairy cows
240			Large Dog 28 - 38 in				1.2 - 1.5 cm ½ in	Fetus readily palpable
270							1.4 - 1.6 cm	

TABLE II

PALPABLE CHARACTERISTICS OF ABNORMAL PREGNANCIES

	<u>Fetal Resorption</u>	<u>Impending Abortion</u>	<u>Mummification</u>	<u>Maceration</u>	<u>Hydrops</u>
Amnionic Vesicle	too small for gestation stage	--	--	--	--
	too soft in pregnancies <45 days	--	--	--	--
Fetal membranes	soft, mushy, dry wrinkled "weak slip"	present	absent	absent	not palpable?
Uterine wall	thickened, increased tone	increased tone	tightly adhered to fetus	thin walled	thin walled
Uterine fluids	decreased amounts	may be decreased	absent	contains bones fetal fragments	greatly increased
Cotyledons	not present	crowded	absent	absent	may be not palpable
Cervix	normal or slight discharge	reddish-brown discharge	normal	purulent discharge	no discharge

absence of tone, edema, fluids in the horns, thinning or thickening of the walls, adhesions, abscesses, and other conditions. A thorough examination of the uterus can then be supplemented by examination of the ovaries and related structures to determine pathologic conditions or stage of the estrous cycle.

Table III summarizes the palpable characteristics of the uterus during the estrous cycle and common pathologic conditions.

Examination of the Ovaries*Dimensions*

Length - 3.5-4 cm

Width - 1.5-2 cm

Height - 2.0-2.5 cm

The above dimensions are average sizes of ovaries not containing functional structures such as corpora lutea (CL). The sizes tend to be smaller in heifers and larger in older cows. The ovaries, when devoid of functional structures, tend to be almost almond shaped. Follicles do little to change shape or size of the ovary while a fully developed corpus luteum results in marked distortion of shape and size. The ovarian stroma is firm and nodular due to corpora albicans and developing follicles.

Follicles

Follicles can be recognized as smooth, slightly raised areas that fluctuate when palpated. They measure about 10mm diameter at midcycle to 20-25 mm just before ovulation. The follicles that develop in the same ovary as the corpus luteum

TABLE III

PALPABLE CHANGES IN THE UTERUS

<u>Condition</u>	<u>Characteristics of Uterus and Cervix</u>
Proestrus--estrus	horns turgid; coiled and thicker; respond to touch. Clear cervical mucus may be expressed from vagina
Metestrus--first 72 hours post ovulation	horns edematous; thicker; do not respond to palpation. Post-estrous bleeding 24-48 hours post estrus
Luteal phase (metestrus, diestrus)	horns lack tone; irritability negligible
Involution	horns and cervix enlarged, thick, firm; lumen and caruncles palpable. Usually complete by 30-35 days post partum
Freemartinism	absence of tubular tract; may find fibrous remnants of uterus, cervix; ovaries absent
White Heifer Disease (Segmental Aplasia of the Müllerian ducts)	absence of all or parts of tract; fluids accumulate anterior to missing portion; ovaries present
Pyometra	fluid in uterus; walls thinner than non-pregnant, thicker than pregnant uterus
Chronic non-productive metritis	uterus lacks tone; walls thinner; caruncles more prominent; can feel the lumen in some
Follicular cysts	uterus edema for first 5-10 days; atrophy of walls, lack of tone, rag-like; markedly shortened horns in some, hydrometra, rarely
Luteal cysts	"normal;" like luteal phase uterus
Ovarian atrophy, hypoplasia	thin walls; feel lumen easily; may contain small amounts of fluid, uterus very flaccid

TABLE IV

CHANGES IN THE CLs CORRELATED WITH STAGES OF ESTROUS CYCLE⁽¹⁾

Description	Code	Stage of Cycle (day)
Ovulation depression	OVD	1- 2
Soft CL; <1 cm in diameter	CH ₁	2- 3
Soft CL; between 1-2 cm diameter	CH ₂	3- 5
Soft CL; >2 cm in diameter	CH ₃	5- 7
Fully developed CL; >2 cm*	CL ₃	8-17
Firm CL; between 1-2 cm diameter	CL ₂	18-20
Firm CL; <1 cm diameter	CL ₁	Estrus to middle of next cycle

*Size measured through largest diameter--not the crown

of the previous cycle feel larger and often protrude from the surface of the ovary near the line demarcation between the corpus luteum and the rest of the ovary. The presence of palpable follicles on the ovaries is of little value in predicting the reproductive status of the cow unless the corresponding palpable uterine changes are also present. Several waves of follicles enlarge, then become atretic during the luteal phase of the cycle. These do not cause palpable changes in the uterus.

The Corpus Luteum

When a follicle ovulates the follicular fluid escapes and the walls collapse forming a soft depressed area about 10 mm in diameter. This area is the ovulation depression (OVD) and

can be palpated for the first 12-24 hours following ovulation. The OVD will be accompanied by marked edema of the uterus. During the next 5-7 days the depression fills with blood, the granulosa cells become luteinized and the corpus luteum (CL) is developed. For purposes of recording changes in the ovary the developing corpus luteum is referred to as a corpus hemorrhagicum (CH) while a fully developed or regressing corpus is referred to as a corpus luteum (CL). The changes in size and consistency of the CL along with the characteristic changes that occur in the uterus during the estrous cycle are the basis for estrus prediction.

The following characteristics help to identify a mature corpus luteum:

1. Increased size of the ovary (a mature CL will double the size)
2. Distortion of shape of the ovary (static ovaries are almond shaped)
3. The crown of the CL (not present in all CLs)
4. Surface and consistency (liverlike, smooth, uniform consistency)
5. Line of demarcation between CL and rest of ovary (the ovarian stroma is firm and nodular)

TABLE VI

PALPABLE ABNORMALITIES OF THE OVARIES - BURSA AND OVIDUCTS

Condition	Palpable Characteristics
Ovarian atrophy, hypoplasia or under	Less than 20 x 5 x 5 mm; no functional structures; uterus small, thin walled, may contain small amounts of fluid
Follicular cysts	Usually multiple; uni or bilateral; >25 mm diameter; distinct fluctuation; smooth surface; thin walls
Luteal cysts	Usually single; walls thicker than follicular cysts; usually less enlargement of ovary >25 mm in diameter
Cystic CL	CL with crown; flucant; NON-PATHOLOGICAL
Tumors	Rare; enlargement; usually firm
Delayed ovulation or anovulation	Must establish location of the same follicle at estrus and again 48-72 hours post estrus; rare
Retained corpus luteum	DOES NOT OCCUR IN THE ABSENCE OF UTERINE PATHOLOGY. Must establish presence of CL of same size and location at last two re-examinations at weekly intervals
Hydro-pyo-hemosalpinx	Local or generalized enlargement of the oviduct
Perisalpingitis	Adhesions, thickening, fibrosis of oviduct, ovarian bursa and mesovarium

TABLE V

CORRELATION OF FINDINGS INDICATIVE OF STAGE OF ESTROUS CYCLE AND TIME TO NEXT ESTRUS⁽¹⁾

Findings in Ovaries and Uterus			Approximate Stages of Estrus Cycle	Days to Next Estrus
			Days	
F	CL ₁	UT (tone)	20-21 (estrus)	0
OVD	CL ₁	UT	0	18-21
CH ₁	S	UE (edema)	1- 3 (metestrus)	18-20
CH ₂	S	UN or E	3- 5	15-18
CH ₃	F	UN (normal)	5- 7 ("midcycle")	13-17
CL ₃	F	UN	7-17	6-11
CL ₂	F	UT	17-19 (proestrus)	1- 4
CL ₁	F	UT	20-21	0- 1

Tables IV and V summarize the palpable changes in normal cycling cows and are the basis for estrus prediction in the cow (1). Table VI summarizes the common palpable abnormalities of the ovaries, ovarian bursa, and oviducts.



Summary

Since rectal palpation provides the only practical means of examination of the internal genital organs the importance of good technique, thoroughness and accurate recording of findings cannot be over emphasized. The "key" to thorough examination is retraction of the uterus. Without this skill an examiner is seriously handicapped.

Selected References

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Roberts, S.J. (1971) Veterinary Obstetrics and Genital Diseases. Ed. 2, S.J. Roberts, Ithaca.—3. The Society for Theriogenology Journal, Vol. VII, 2nd Ed., 1976—4. Zemjanis, R., Fahning, M.L. and Schulta, R.H. (1969) Anestrus: the Practitioner's dilemma. Vet. Scope XIV, 1:15-21.



Panel Discussion

Question: Can you diagnose freemartinism in a baby calf?

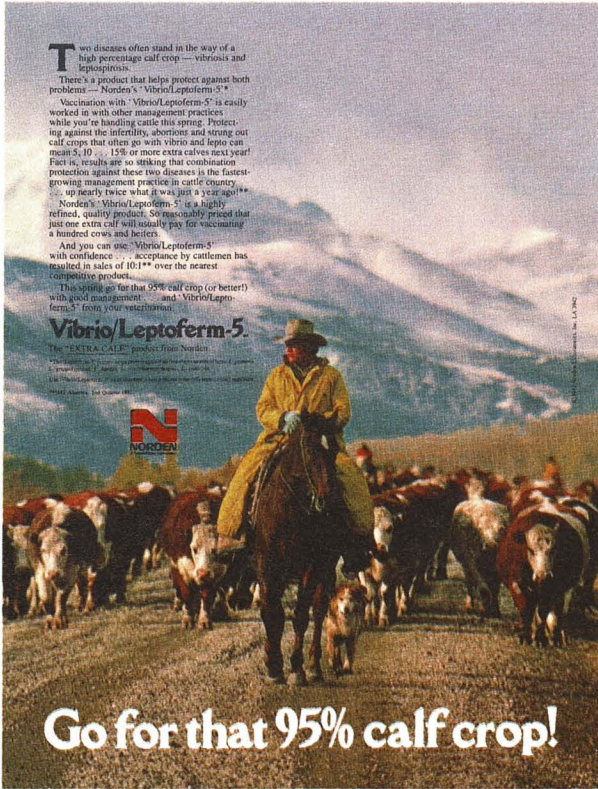
Answer: Yes; the Fincher pencil test or the test tube test. I don't have a lot of confidence in it because I don't encounter that many and never had a chance to practice it that much. I just assume that if they're born twin to a bull that they're going to be, and if they want to take a chance on keeping them around long enough I will palpate them. Without palpating them I surely wouldn't be confident. The pencil or tube is inserted into the vulva and checked to see how far it will penetrate.

Question: What effect does pregnancy have on uterine and ovarian activity in the first 15 days of pregnancy?

Answer: No effect, I would say, the fact that it is pregnant will keep the animal from coming back into heat, but there would be no other way that any other difference would occur during the first 15 days. I wish there were because we could sure use an early pregnancy test of some kind!

Question: Are there more cysts in cows that are treated with prostaglandin?

Answer: I don't know. There are a lot of conflicting reports on that. Some people have indicated that there may be an increase and other people have not observed this, so I really cannot answer that. I don't think I'm seeing any more.



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Vibriosis: A leading cause of infertility?

Q. What is vibriosis?

A. It's a genital infection, widely spread by natural breeding, by artificial insemination with contaminated semen or by contaminated instruments.

Q. What are the first signs of a vibriosis infection?

A. Usually, there's a need for repeated breeding. Vibriosis causes early death of the embryo and a new heat cycle then begins. Infected cows may require a dozen services for a positive pregnancy. Vibriosis can also cause abortions at any stage of pregnancy.

Q. What's the effect on the calf crop?

A. It varies. If there's infection in the cow herd and breeding is limited to a 2 or 3 month period, it's possible to have a calf crop of only 20 to 25%!

Q. That's not typical, is it?

A. No . . . and in ways this is unfortunate. Because then the cattlemen would immediately recognize the size of the problem and take steps to correct it. More typically the vibriosis lags in slowly and takes its toll over a longer period of time. This is particularly true in more mature herds.

Q. Explain that, will you?

A. What happens is that cows, through repeated exposure, can develop immunity. But the immunity fades with time and they soon become susceptible again. As a result, cows calve normally one year then miss a year. The problem often slips

by unnoticed, but it may be costing the owner 5 to 15% of his total calf crop potential and the extra cost of carrying open cows.

Q. I see . . . and along with the reduced calf crop, he has the problem of delayed breeding.

A. Good point. And as the saying goes, once late, always late. It adds up to a stung-out calf crop. Which means extra work . . . lighter calves at market . . . or as replacements. When you put this on top of the reduced size of the calf crop, vibriosis is a very expensive disease. Now, let's look at another major disease problem . . . leptospirosis.

times, lepto can be responsible for problems in breeding, in generally lower performance of cattle, or in the death or sickness of young calves.

Q. Can lepto be treated?

A. There's really no effective treatment once the disease develops beyond the initial stage. Prevention by vaccination is the recommended control.

Q. I've heard there's more than one kind of lepto.

A. True. There are five major strains. It's possible for a herd to be infected by one or more strains at the same time.

Q. And vaccination can help prevent all five strains?

A. Yes. Let's look at the elements of a successful program for control of both lepto and vibrio.

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Lepto . . . killer of the unborn.

Q. What is lepto?

A. We sometimes call lepto "redwater." It's a highly contagious disease that infects the kidneys and liver, usually causing lesions and/or anemia. Lepto is spread in the urine of diseased animals.

Q. What are the first signs of lepto?

A. In some cases, lepto exists as a low-level infection that produces only mild and often unnoticed reactions. In a breeding herd, the owner's first indication of trouble may be an abortion storm, commonly going through the herd in about the seventh month of pregnancy. At other

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*IMS America, Second Quarter 1981.

