Instructions
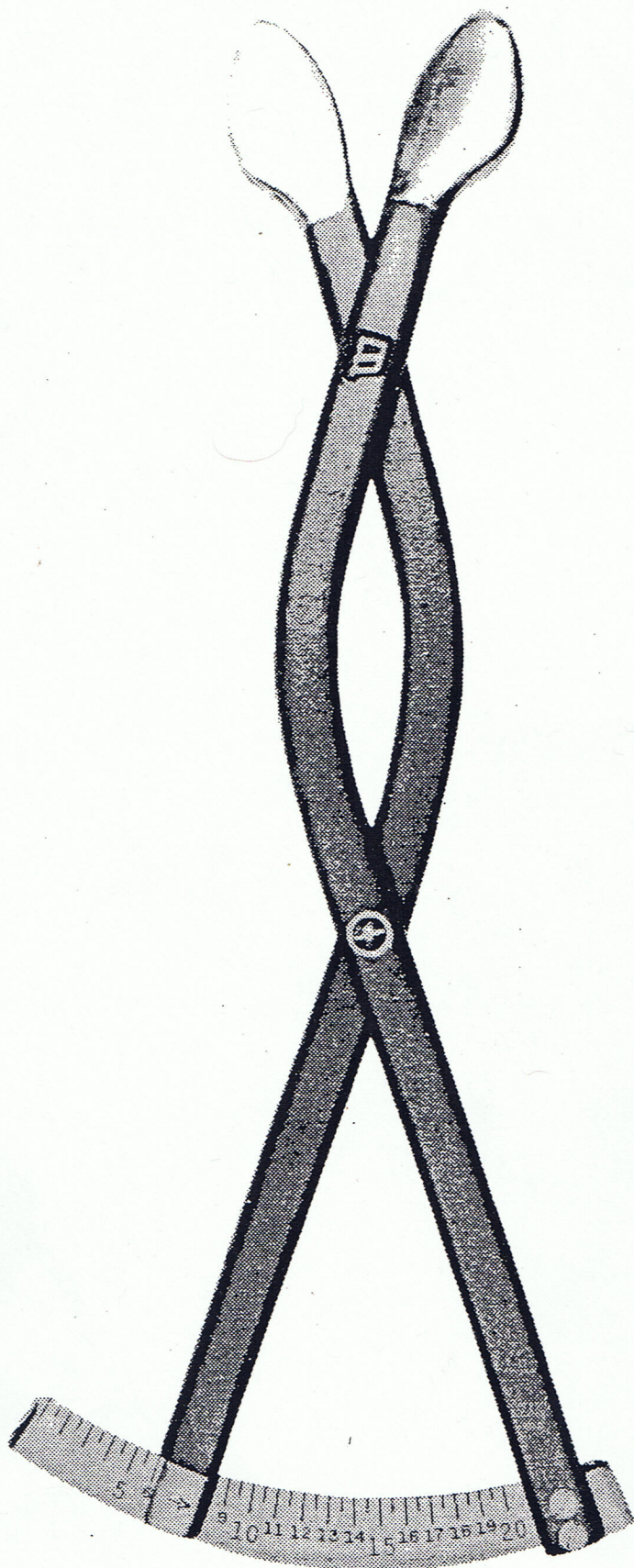# for
RICE
PELVIMETER
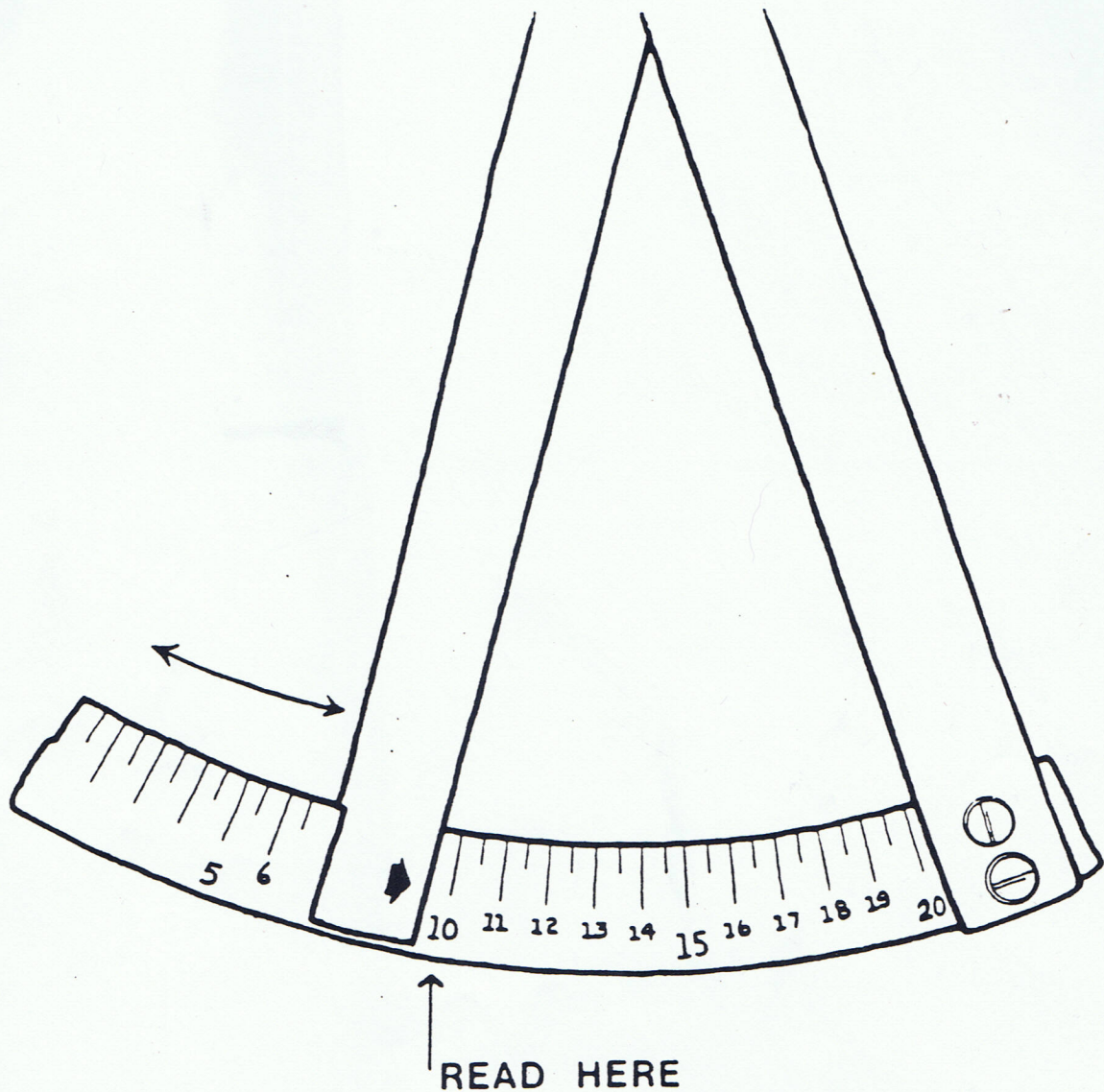
THE RICE PELVIMETER

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The Rice Pelvimeter is a measuring device for taking pelvic measurements.

The instrument consists of two cast aluminum arms and a stainless steel scale graduated in centimeters. The measurements are read on the inside of the measuring arm marked with an arrow (see diagram).

READ HERE

I.   MEASURING WITH THE RICE PELVIMETER

Two measurements are made via the rectum, a vertical measurement and a horizontal measurement. The vertical measurement is taken by holding the pelvimeter in a vertical position, spreading the jaws slowly while placing the end of one jaw on the symphysis pubis and the other jaw on the sacral vertebrae (refer to the detailed drawing). When taking the height measurement do not squeeze the pelvimeter too hard as the lower jaw may slip off the pubic symphysis or the upper jaw may move off the center of the backbone giving you a larger measurement. The horizontal measurement is taken at the level of the poas tubercles the widest area of the pelvis. The poas tubercles form a depression point in the shafts of the ilium. Generally, most cattle will have a larger vertical measurement than horizontal. When a heifer has a high pelvic symphysis, this will decrease her pelvic height. Two breeds generally have taller pelvic heights. They are Brahman cross and Salers. Some of the Simmental and Gelbvieh yearling heifers are wider than their height measurement. With a little practice the measurement is easily taken. To obtain the relative pelvic area, these two measurements are multiplied together.

SACRAL VERTIBRAE

SHAFT OF ILIUM

SYMPHYSIS PUBIS
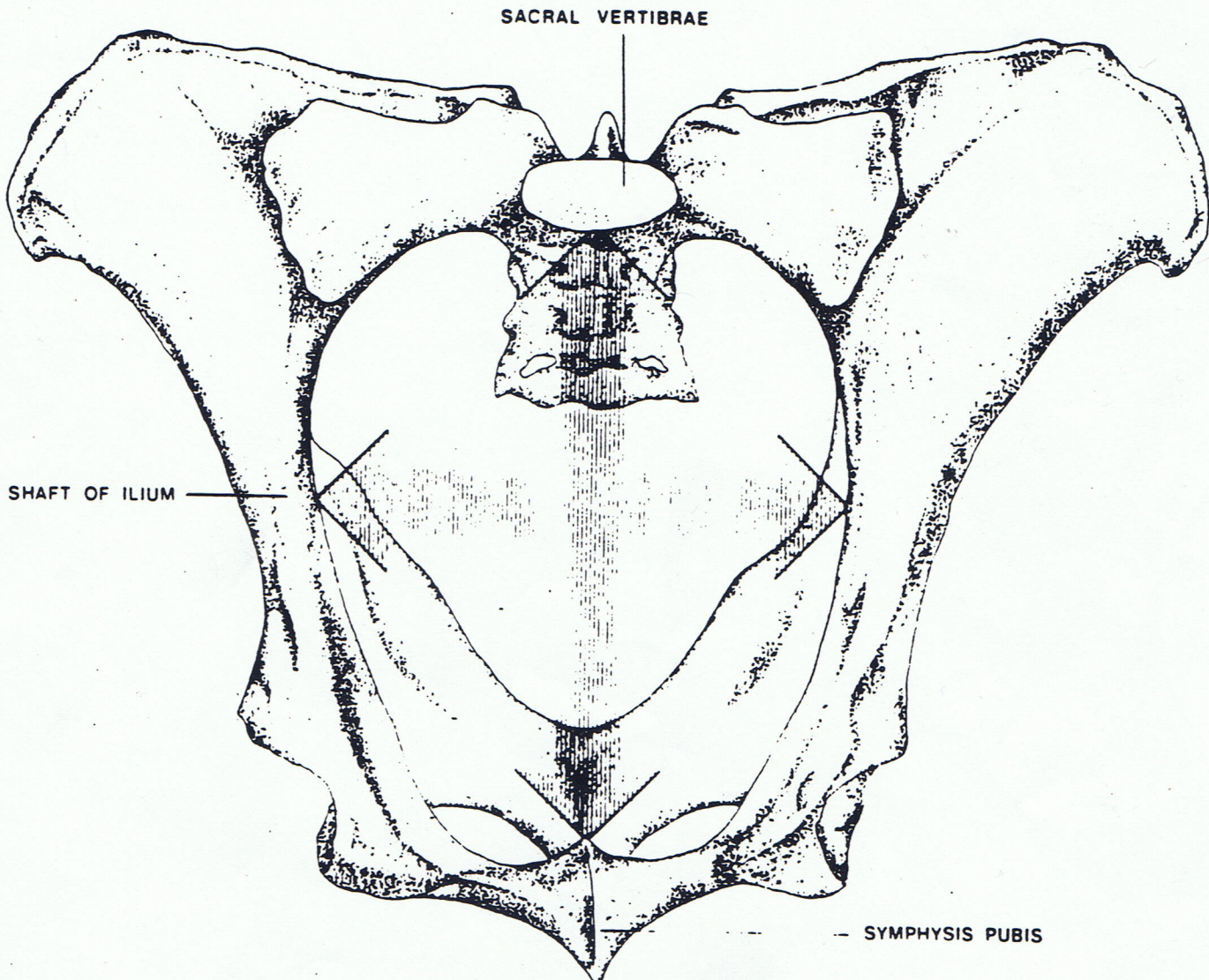
II.   RELATIONSHIP OF PELVIC MEASUREMENT TO CALVING DIFFICULTY

Calving problems occur mainly in females having their first calf. The major contributing factor influencing calving problems is size or weight of the calf. The second is the area of the pelvic opening in the mother. These factors can be controlled by using sires with low EPDs for birth weight with high accuracies (>85%) and eliminating heifers before breeding with small pelvic area (<140 cm^2 at 13 months of age). There is no way to eliminate abnormal presentations of calves at birth which cause calving problems.   There are four things that influence pelvic area in yearling heifers: (1) Genetics of their sire and dam, (2) breed, (3) level of nutrition, and (4) if they had received growth stimulating implants before a year. All four of these factors can decrease or increase pelvic area. Certain breeds such as Brahman, Brahman crosses, Salers, and other continental breeds have larger pelvic areas as compared to the British breeds. Also, certain breeds have shorter gestation length and give birth to smaller calves. These factors can be used in identifying females that have less calving problems for the commercial producer.

The pelvic area grows at a fairly constant rate from 9 to 24 months of age. Heifers pelvic area increases slightly faster from 10 to 15 months versus 16 to 24 months. The Continental and Brahman breeds average growth is .30 cm^2 per day and the English breeds are .25 cm^2 per day. This relates to 8 or 10 cm^2 increase per month for this period. This allows you to measure the pelvic area at any time. It is recommended that heifers be measured before breeding and small ones be culled, fed out in the feedlot, or kept open as grass cattle. To decrease calving problems in first-calf-heifers, remember that you must work on the two major factors that cause the problem--weight or size of calf and pelvic area. Data collected at the San Juan Basin Research Center in Hesperus, CO shows both weight of calf and pelvic area influence calving difficulty (Table 1).

TABLE 1. RESULTS ON CALVING DYSTOCIA IN FIRST-CALF-HEIFERS

Yearling Pelvic Size (cm^2)[a]		No. Calves Born	Birth Weight of Calf (lbs)		% of Calves Assisted
(Small)	100-145	60	(Large)	77-125	80%
(Large)	146-220	69	(Large)	77-125	48%
(Small)	100-145	79	(Small)	45-76	42%
(Large)	146-220	62	(Small)	45-76	19%

[a] Pelvic measurements were taken at approximately 13 mo. of age.

These data were collected over a three year period on first-calf-heifers by the same person and can be summarized as follows:

1.   Both pelvic area and birth weight of the calf influence calving difficulty.

2.   When pelvic area was small and birth weight was large, 80% of the calves were assisted.

3. When large pelvic area and large births existed, calving difficulty was reduced from 80% to 48%. By selecting for both calf weight and pelvic area, calving problems can be decreased by about 75% (Pelvic + Calf Wt = 19 vs 80%).

4. When small pelvic area and light birth weights existed, calving difficulty was reduced from 80% to 42%.

5. When large pelvic area and light birth weights existed, calving difficulty was reduced from 80% to 19%.

6. All of the caesareans were from heifers with small pelvic areas (100-145 cm^2) and large birth weights (77 to 125 lbs).

7. Some calving difficulty is unrelated to birth weight and pelvic area and is therefore unavoidable.

Dr. Gene Deutscher has developed a formula for ranchers to determine what weight calf they must have to eliminate calving problems when you know what the heifers pelvic size and weight is at different ages before calving (Table 2).

TABLE 2. PELVIC AREA/CALF BIRTH WEIGHT RATIOS FOR VARIOUS HEIFER WEIGHTS AND AGES TO ESTIMATE DELIVERABLE CALF

Heifer Weight (lbs)	Age at measurement, months			
	8-9	12-13	18-19	22-23
500	1.7	2.0		
600	1.8	2.1		
700	1.9	2.2	2.6	
800		2.3	2.7	3.1
900		2.4	2.8	3.2
1000		2.5	2.9	3.3
1100				3.4

Examples for using this table would be two heifers weighing 700 lbs at 12-13 months of age.

	Pelvic Area					Wt. of calf with No Problems
Heifer A	145	÷	2.2	=		< 66 lbs
Heifer B	180	÷	2.2	=		< 82 lbs

TABLE 3. LEAST-SQUARES MEANS FOR YEARLING BULL TRAITS (1984 TO 1990)

Breed	No. of Head	Birth Wt (lbs)	Off Test Height (in)	Off Test Weight (lbs)	Pelvic Height (cm)	Pelvic Width (cm)	Pelvic Area (cm²)	Scrotal Circumference (cm)
Hereford	769	84	49.0	1023	12.9	11.2	145	34.4
Polled Hereford	122	88	49.4	1030	13.0	11.2	146	33.5
Red Angus	242	78	48.9	1033	12.9	11.6	150	34.0
Angus	117	86	48.8	1030	13.1	11.3	148	34.2
Simmental	104	91	52.0	1160	13.3	12.2	161	36.2
Limousin	66	88	51.1	1063	13.3	12.0	161	31.5
Salers	62	84	52.4	1075	14.3	12.1	174	32.7
Gelbvieh	24	84	51.1	1069	13.5	11.6	160	34.1
Charolais	24	88	51.8	1061	13.5	12.2	165	33.5
Brangus	53	80	51.0	1002	14.6	11.4	167	32.6
System 1 Composite	65	87	49.7	1058	13.5	11.7	157	34.3
System 2 Composite	70	83	50.4	1060	14.2	11.2	161	33.6
Total or Average	1718	85	50.5	1055	13.5	11.6	158	33.7
Growth/day*			.021	1.97	.009	.01	.23	.016

* Difference between 10 month old bulls and bulls at 14 months.

Breeding heifers with very large pelvic areas to have calves over 95 lbs. will likely result in calving difficulty.

III.   ADVANTAGES OF PELVIC MEASURING BULLS

Recent research results indicate pelvic area is highly heritable (40-60%). For this reason pelvic area can be increased with selection in both heifers and bulls. One must know what average pelvic size is in your heifers to determine what pelvic size you need for the bull if you want to make improvement. Generally, the bulls pelvic area does not grow as fast as heifers when fed to grow at the same daily gain. Young bulls, 9-11 months or bulls weighing less than 900 pounds are hard to measure because of the tight sphincter muscles around the anus. Soap or lubricant will be needed to measure these types of bulls. Table 3 shows you the average pelvic area for 10 different breeds of bulls which was collected at the Four Corner Bull Test over 7 years. These bulls averaged 12 months of age. There are small numbers in the Continental breeds so one must take this into consideration. The average pelvic area for 1,718 bulls was <u>158 cm²</u> and weight was <u>1055 lbs</u>. Their estimated pelvic growth from 10 to 14 months of age was <u>.23 cm²</u> per day. Continental and Brahman cross breeds are probably growing <u>.25 cm²</u> per day at a larger weight. Table 4 gives you the correlations or relationships for four traits including pelvic area. Three items of importance should be noted:

1.   Pelvic area and scrotal circumference have a small relationship (.04).

2.   Pelvic area is highly related to yearling weight (.41) and yearling hip height (.57).

3.   Pelvic area is only slightly related to birth weight (.13).

For these reasons, ranchers who want to hold the size down on their cattle will have to be careful in selecting bulls with large pelvic areas. Since the relationship between birth weight and pelvic area is only small, we should be able to obtain bulls with good pelvic areas and light birth weights.

TABLE 4. RESIDUAL CORRELATIONS AMONG YEARLING BULL TRAITS
(1984-1990)

Trait	Yearling Hip Height	Yearling Weight	Pelvic Area	Scrotal Circumference
Birth Weight	.22	.24	.13	.08
Yearling Hip Height		.62	.57	.07
Yearling Weight			.41	.38
Pelvic Area				.04

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