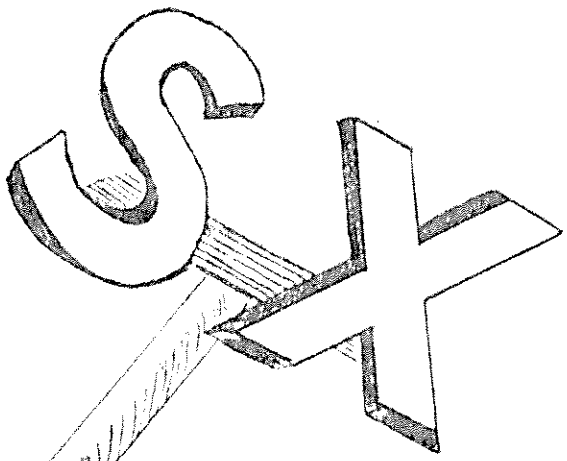
BEEF CATTLE AND RANGE

FIELD DAY

LIVESTOCK AND RANGE RESEARCH STATION
MILES CITY, MONTANA

MAY 10, 1979



SCIENCE AND EDUCATION ADMINISTRATION - AGRICULTURAL RESEARCH

UNITED STATES DEPARTMENT OF AGRICULTURE
IN COOPERATION WITH
MONTANA AGRICULTURAL EXPERIMENT STATION
AND
COOPERATIVE EXTENSION SERVICE OF MONTANA

Current Research with Line 1 Herefords

Livestock and Range Research Station
Miles City, MT
R. R. Woodward

The Problem. There is increased concern among beef cattle producers over calving difficulty. The trend line of calving losses at the Livestock and Range Research Station (LARRS) confirms this concern. The major reasons for increased calving difficulty throughout the United States are:

1. Calving cows at earlier ages.

Earlier calving increases the lifetime production of a cow. A majority of the cows in the U. S. now are calved at two years of age. In a study at LARRS involving over 13,000 births it was determined that death losses of calves from two-year-old cows were three times greater than from mature cows while losses from three-year-old cows calving for the first time were "only" twice as great.

2. Increased crossbreeding involving larger breeds.

Almost all of the breeds imported from continental Europe are larger than the Herefords, Angus and Shorthorns to which they have been bred. Mating these large mature weight sires to smaller mature weight cows also has contributed to the increase in calving difficulty. This cause of calving difficulty will continue because of the wide variation in breeds now available for crossbreeding.

3. Selection for increased growth rates.

The effective improvement of beef cattle growth rates has caused an increase in birth weights as heavy birth weights are highly correlated with subsequent fast growth. Since birth weight is the single most important cause of difficult calving there has been a commensurate increase in calving difficulty.

Research Objective. In a study of birth weights among the top ten bulls in yearling weight ratio in Line 1 for the past 12 years it was found that the range in age of dam adjusted birth weights was almost 40%. This fact gives promise that selection for lower birth weights can be effective because of the wide variation in birth weights among the fast growing bulls. Accordingly Line 1 has been sub-lined into two herds. Replacement sires in the Y sub-line are selected as they have been in the past 45 years--primarily for high yearling weight ratios and acceptable conformation. In the YB sub-line, average or below average birth weight of sires is an additional selection criterion.

In the first year the sires used in the Y herd averaged 92.5 lbs. at birth and in the YB herd 86 lbs. Weights of the calves in the Y herd averaged 2.7 lbs. heavier at birth. This year (1979) there will be a higher selection differential with 18 lbs. difference in the average birth weights of the sires used in the Y vs. the YB herds.

The objective of this study is to determine if it is possible to reduce birth weights and calving losses without a significant change in subsequent growth rates. Although birth weights have been obtained at the LARRS since Line 1 was started in 1934, they have not been considered as a part of the selection process.

Certainly enough is known about the correlation between birth weight and calving difficulty at this time to recommend that low birth weight bulls should be selected for breeding to virgin heifers. It is thought that selection of low birth weight bulls within a breed is a more reliable method of reducing calving problems than merely changing to a breed that averages low in birth weights.

A Study of Improvement Obtained in Line 1 Cattle Over a 22 Year Period

Livestock and Range Research Station
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This study was accomplished by artifically breeding different generations of sires to the same cow population. All sires were progeny tested (male calves in the feedlot) and their heifer progeny subsequently evaluated for maternal performance.

Two generation interval comparison: In Line 1 (L1) the three sires designated as the early generation (G1) sires were born in 1953 and 1955, while the two L1 sires designated as later generation (G2) sires were born in 1962 and 1963. Semen from the 1953 and 1955 sires, collected and stored during or after the sires use as herd sires, made possible the subsequent matings after approximately two generations of selection.

The heifer progeny were bred at 2 and 3 years of age to produce two calf crops for their maternal evaluation. In each of the two breeding seasons, G1 and G2 heifers were bred to the same unrelated sire.

The improvement in the Line 1 cattle over this time interval was estimated by the comparison of outcross progeny produced concurrently from inbred sires selected from two time periods. The improvement, therefore, represents what resulted from using inbred sires born two generations apart on outcross females. The actual genetic improvement within the line, however, would be expected to be greater since the improvement reported here represents sire effect only.

The G2 sires increased birth weight (steers and heifers combined) by 2 lbs.; 180-day weaning weight by 35 lbs. and at the end of the 224 day feedlot period, the steers by G2 sires were 72 lbs. heavier and yielded 43 lbs. additional carcass weight.

Heifers from G2 sires were 27 lbs. heavier at 18 months of age off grass and maintained essentially this small weight advantage to four years of age when they produced their last calf crop. Weaning weights of calves from heifers from G2 sires were essentially the same as for the calves from heifers from G1 sires. This may indicate that under our dry range conditions the genetically superior heifers were limited in milk needed to support their potentially faster growing calves. This phase of the study needs supporting data before definite conclusions may be drawn.

Four generation interval comparison: In the second comparison of this study currently being conducted (sires of 1953 and 1955 vs. sires of 1974 and 1975) the growth responses of bull calves from sires of the later generation again are superior to the bulls of the earlier generation. (See exhibits on display at Field Day.)

The use of stored (frozen) semen has proven to be an effective means of comparing the genetic progress in beef cattle over time periods. This is especially important when environment varies widely from year to year as it does in most range areas. Selection for yearling weight has been effective in increasing all the major growth traits in Line 1 for this 22 year period of the study.

Biological Types of Beef Cattle Under Range Environments

Livestock and Range Research Station
Miles City, Montana
W. L. Reynolds, J. J. Urick, O. F. Pahnish

This study involves the cooperation of the Livestock and Range Research Station, Miles City, Montana, the Meat and Animal Research Center, Clay Center, Nebraska and the State Experiment Stations of Montana and Nebraska. This report contains only results from studies in progress at the Livestock and Range Research Station.

Different biological types of beef cattle need to be evaluated under western range conditions to provide guidelines to selection and management practices for optimum beef production. An objective is to evaluate these biological types as cows and the performance of their progeny from birth to market age.

From 1974 through 1977, a herd of approximately 280 Hereford females were bred by artificial insemination to Angus, Pinzgauer, Red Poll and Simmental bulls to produce the F_1 crossbreds. This program was repeated yearly until at least 60 F_1 females by each sire breed were obtained. In 1977, a group of Tarentaise X Hereford F_1 females were donated by breeders throughout Montana and in 1977 Tarentaise bulls were included as a sire breed. Existing information from European sources suggest that the Simmental and Pinzgauer should be the largest of the sire breeds in mature size and the Angus and Red Poll the smaller of the sire breeds. The Simmental are expected to have higher milk production than the Pinzgauer and the Red Poll to have higher milk production than the Angus.

The first-cross heifers were kept to form a herd of breeding females and were fed to gain about 1.25 lb. daily during the winter after weaning. The first-cross steers were fed a silage-concentrate ration individually in dry lot after weaning. The steers are slaughtered at different intervals and evaluated. Yearling crossbred heifers are exposed to Shorthorn bulls in multiple sire breeding herds while the 2-year-old and older crossbred cows are exposed to Charolais bulls in multiple sire herds. All of the offspring, both male and female, from the first-cross dams are placed on feed after weaning in the fall. When 60% of the steers from Angus-Hereford dams grade choice, one third of all the steer progeny are slaughtered. One third will be slaughtered at each of two 28-day intervals thereafter to obtain carcass data.

This report contains the preliminary results from the initiation of the project in 1974. Data from only one year are currently available in many instances. At birth, (4 year's data), the calves from Pinzgauer and Simmental sires were heavier (89 and 88 lb., respectively) than the calves from Angus (77 lb.), Red Poll (82 lb.), and Tarentaise sires (80 lb. - one year's data). The 200 day weight of those first-cross calves by sire breed was Tarentaise, 431 lb. (one year's data); Simmental, 423 lb.; Pinzgauer, 415 lb.; Angus, 412 lb.; and Red Poll, 398 lb. Calves from Tarentaise and Angus sires appeared to have higher condition scores than calves of the other breeds.

The Tarentaise steers will be evaluated in the feedlot in 1979-80. To date, the Simmental and Pinzgauer sired steers gained more rapidly in the feedlot than the Angus and Red Poll sired steers. There was no difference in feed efficiency of the Simmental, Pinzgauer and Red Poll sired steers which

were more efficient than the Angus sired steers. A higher percentage of the Angus sired steers graded prime and choice at slaughter than steers of the other breed groups.

At 18 months of age, the Simmental X Hereford heifers were the largest (874 lb.) followed by the Pinzgauer X Hereford (856 lb.) and the Angus X Hereford (835 lb.). The Red Poll X Hereford were the lightest (811 lb.).

Pregnancy rates of 18 month old heifers to date were higher for the Angus X Hereford (96%) and Red Poll X Hereford heifers (94%) than for the Pinzgauer X Hereford (88%), Simmental X Hereford (80%) or Tarentaise X Hereford heifers (77%). Death losses of calves from 2-year-old heifers were higher for Tarentaise X Hereford (30%), Angus X Hereford (26%) and Pinzgauer X Hereford heifers (22%) than for Red Poll X Hereford (7%) and Simmental X Hereford heifers (8%). Calves from Pinzgauer X Hereford heifers were about 4 to 8 lb. heavier at birth than calves from the other breed groups.

Shorthorn sired calves from 2-year-old Tarentaise X Hereford dams were the heaviest to date at 200 days of age (451 lb.) followed by those from Pinzgauer X Hereford (429 lb.), Simmental X Hereford (427 lb.), Red Poll X Hereford (420 lb.) and Angus X Hereford (418 lb.). The 200 day weights of Charolais sired calves from 3-year-old first-cross cows were Simmental X Hereford (494 lb.), Pinzgauer X Hereford (481 lb.), Red Poll X Hereford (474 lb.) and Angus X Hereford (450 lb.).

MANAGEMENT OF REPLACEMENT BEEF HEIFERS

Livestock and Range Research Station
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R. B. Stalgmiller, W. M. Moseley, R. A. Bellows, R. E. Short

Research has shown that heifers which calve in the early part of the calving season when dropping their first calf will tend to do so throughout their productive lifetime. Also, fewer of them will have an open year during their productive life than will those that calved later their first year. Hence, replacement heifers should reach puberty by the start of the first breeding season to assure early conception and early calving. This means that heifers must reach puberty by 15 months of age at the very latest.

In the British breeds, most heifers will reach puberty by 625-675 pounds while for some of the exotic breeds weight of 750 to 800 pounds may be necessary. These are desirable "target weights"; that is, weights the heifers should attain by the start of the breeding season. The appropriate feed level for the winter feed period can be determined by calculating the rate of gain necessary to get from weaning weight to the target weight.

$$\text{Daily Gain Needed} = \frac{\text{Target weight-Weaning weight}}{\text{Days from weaning to begin breeding}}$$

At LARRS, we have found as much as 80-100 pounds difference in weight between the lighter heifer calves and the heavier ones at weaning. Increasing feed efficiency can be gained by separating replacement heifers by weight and feeding each to their own required rate of gain to reach the desired target weight by start of breeding. Studies using this management scheme have repeatedly shown not only an increased feed efficiency but also that the amount of additional feed required to get light heifers to the target weight is more than is economically feasible. Hence, replacement heifers should be selected from the larger, growthier heifers if at all possible.

Another advantage of the larger heifers is that they tend to have a greater skeletal development. This means a larger pelvic opening which should decrease the stress of calving as a 2-year-old.

Forage Production on Saline Soils

Livestock and Range Research Station
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R. S. White, R. G. Lolmiller, P. O. Currie

Saline soils present a formidable management problem in Montana and the Northern Great Plains. Generally they are not suited to crop production; but with proper handling, they can be utilized for hay production and grazing by domestic stock. Two types of saline soils are common. In one, summer fallowing practices used in small grain production can result in saline seep. The other type of saline soil occurs on sites that are inherently high in exchangeable salts because of the parent material from which the soil profile developed. It is this second type of soil that is being examined in our study.

This study is being conducted on the Bowdoin soil series. Bowdoin soils are characterized by 5 to 15 percent exchangeable sodium in the A horizon and 15 to 30 percent exchangeable sodium in the C horizon. They consist of very fine montmorilonitic clay which forms in alluvium on low terraces and flood plains. Bowdoin and Bowdoin-like soils are most common along the Milk River and Missouri River drainages, and as such there are thousands of acres of these problem soils in eastern Montana. Analysis of the soil in our study shows that it has a higher sodium content and greater electrical conductivity than that commonly associated with most Bowdoin soils. In this respect, our results should have wide application on many sites which have a less serious salinity problem.

The primary objective of our study is to examine the production potential of both native and improved forage species on Bowdoin soils. In addition to yield information, observations are also made on stand establishment, seedling vigor, and winter injury. In the fall of 1977, nine varieties were dormant seeded across six replications in plots 50 x 700 ft. (0.8 acre). The varieties used included: (1) Jose tall wheatgrass, (2) Largo tall wheatgrass, (3) Alkar tall wheatgrass, (4) Platte tall wheatgrass, (5) Kenmont tall fescue, (6) Rosana western wheatgrass, (7) P-15590 basin wildrye, (8) Greenleaf pubescent wheatgrass, and (9) Lutana cicer milkvetch.

Plant counts in the spring and summer, 1978, revealed that only the tall wheatgrass varieties and Kenmont tall fescue had sufficient seedling emergence and survival to establish grass stands. Other varieties either failed to germinate or died shortly after seedling emergence. As a result, the four plots that failed in each replication were disked so that additional varieties could be tested.

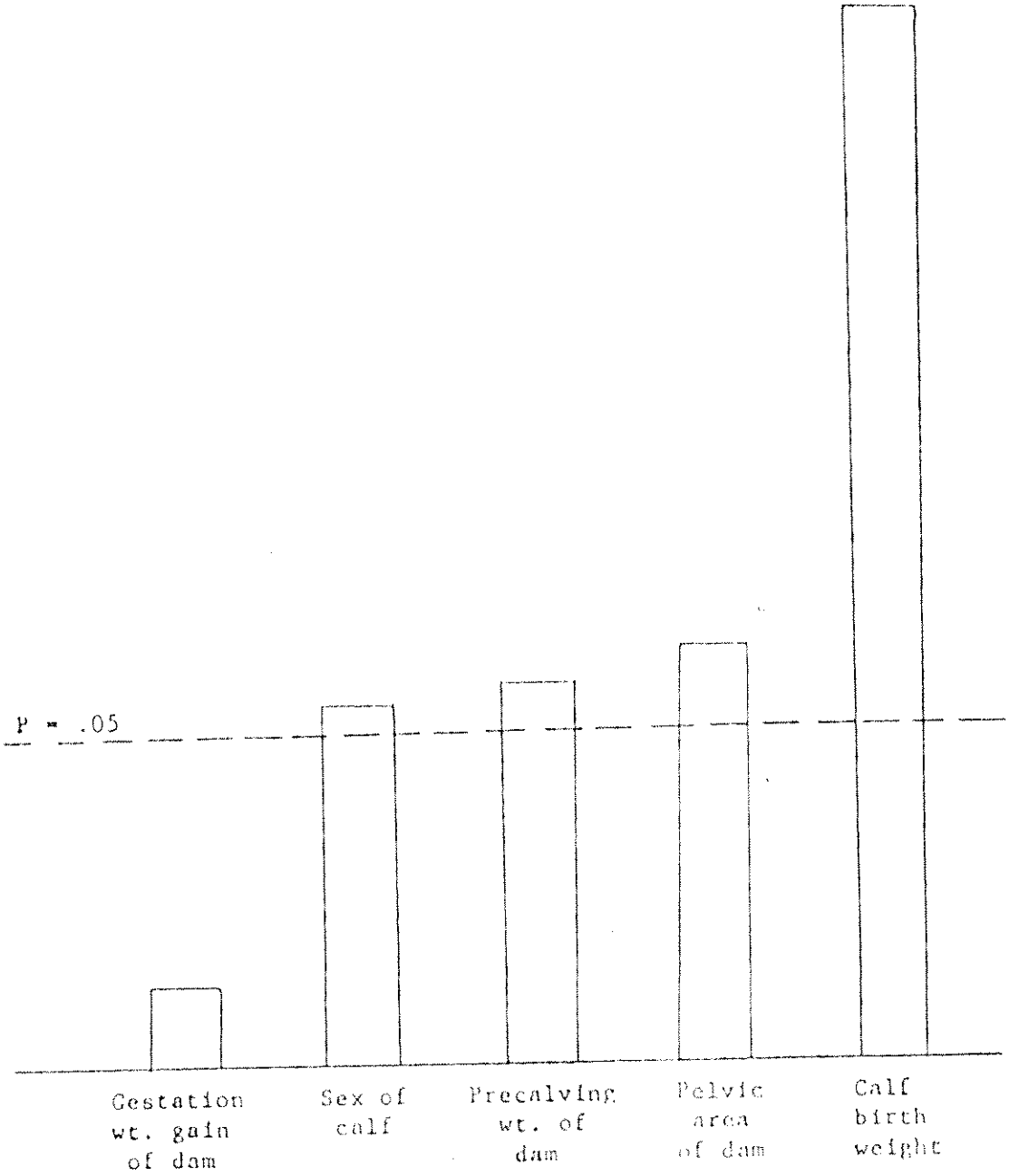
The four new varieties that will be incorporated into the study include: (1) Altai wildrye, (2) Mammoth wildrye, (3) Beardless wildrye, and (4) Ruby Valley pointvetch. An individual planting of a bluebunch wheatgrass-quack grass hybrid has also been added. Approximately 70 lines of this hybrid cross are represented, and they will be evaluated with respect to survival and subsequent performance.

Our study is in the preliminary stages of development. Since forage yield must be determined over several seasons, it will be about five years before specific recommendations can be made. However, initial results are encouraging, and it appears that management improvements can definitely be made on these harsh soils.

FACTORS AFFECTING DYSTOCIA IN HEIFERS

Livestock and Range Research Station
Miles City, Montana

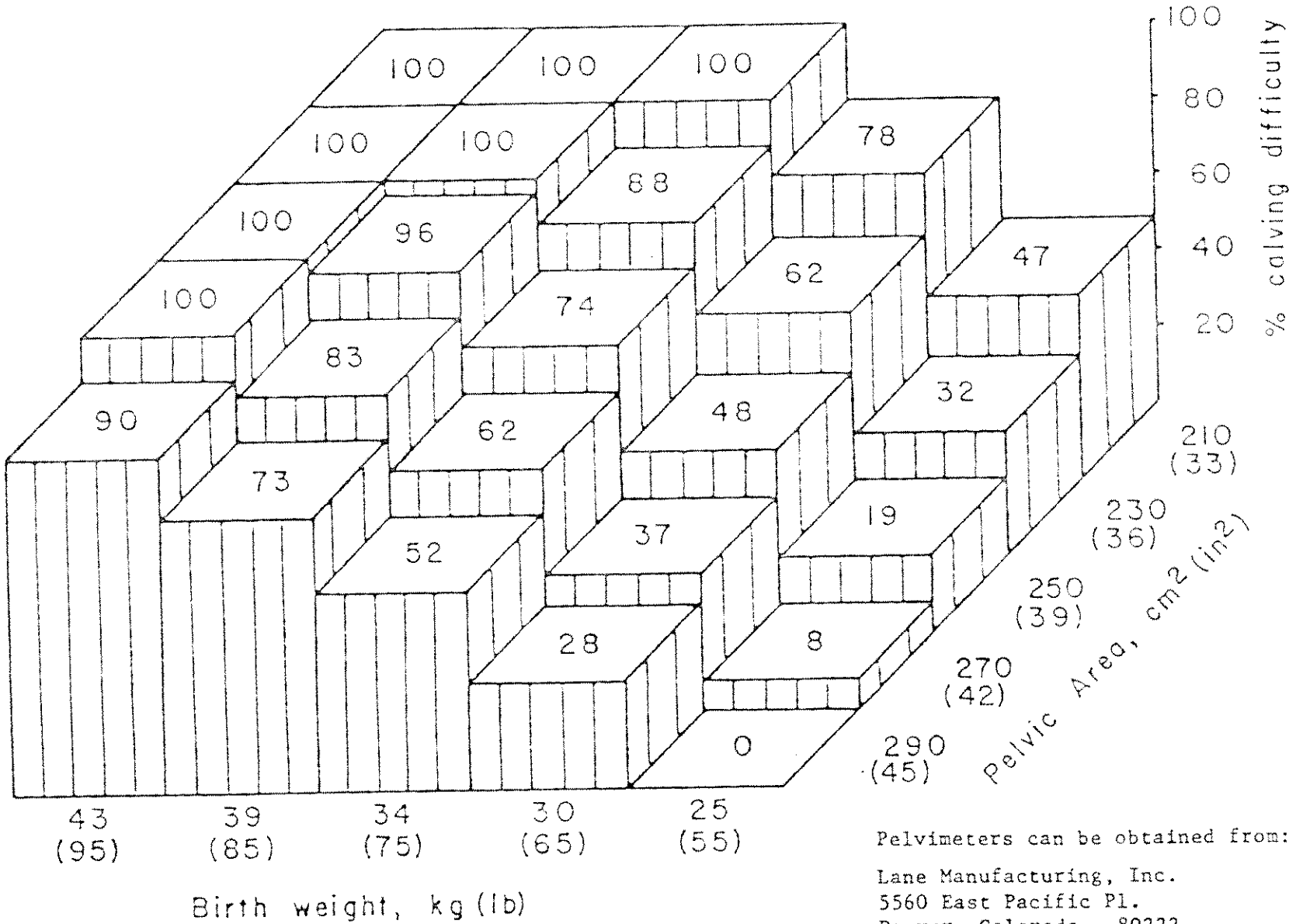
R. A. Bellows and R. E. Short



RELATIONSHIPS AMONG PELVIC AREA, BIRTH WEIGHT AND PERCENT CALVING DIFFICULTY

Livestock and Range Research Station
Miles City, Montana

R. E. Short and R. A. Bellows



Pelvimeters can be obtained from:

Lane Manufacturing, Inc.
5560 East Pacific Pl.
Denver, Colorado 80222

RECOMMENDED SCORING SYSTEM FOR BULLS
Breeding Soundness Examination
(adapted from BIF and Society for Theriogenology)
Livestock and Range Research Station
Miles City, Montana
R. A. Bellows

A. Bulls are to be scored for testicular size (scrotal circumference) and morphology and motility of semen. The scoring for each is as follows:

1. Semen motility:

Classification	Score
Very good	20
Good	12
Fair	10
Poor	3

2. Semen morphology:

Classification	% primary abnormalities	% total abnormalities	Score
Very good	<10	<25	40
Good	10-19	26-39	24
Fair	20-29	40-59	10
Poor	>29	>60	3

3. Scrotal circumference (all breeds except Brahman) measured in centimeters:

Classification	Circumference by age (months)				
	12-14 mo.	15-20 mo.	21-30 mo.	30+ mo.	Score
Very good	>35	>37	>39	>40	40
Good	30-35	31-37	32-39	33-40	24
Poor	<30	<31	<32	<33	10

Assign a score for each of the items above and add these three together to get a total score. The breeding soundness evaluation is as follows:

Breeding soundness	Total score
Satisfactory potential breeder	60-100
Questionable potential breeder	30-59
Unsatisfactory potential breeder	0-29

B. In addition, bulls should be evaluated for physical soundness and classified as acceptable or unacceptable. An unacceptable evaluation in any category disqualifies the bull at that time. Recovery and reevaluation to acceptable is possible in some cases. Evaluations should include:

1. Structural soundness. Must be free of abnormalities of feet, legs, eyes or other anatomical features which would prevent efficient breeding.
2. Reproductive tract. The testicles, epididymis, scrotum, penis, sheath and internal accessory glands must be free of injury, abnormalities and disease.
3. It is also helpful to test mate (especially young bulls) each bull to a cow in heat to establish the fact that a bull is physically able to breed.

CONDITION SCORE GUIDELINES FOR SCORES 1 THROUGH 10

Livestock and Range Research Station
Miles City, Montana
R. A. Bellows and J. B. Carr

Condition scores	Condition class	Description
1, 2, 3	Thin	Backbone and ribs very prominent and little or no fleshing or fat can be felt. Bones of back are very sharp. Survival of animals with lowest scores is questionable during periods of prolonged stress.
4, 5, 6, 7	Moderate	Backbone and ribs can be felt but through a layer of flesh or fat of varying thickness. The spinal processes of the backbone feel rounded and are not sharp. In cows scoring 7, firm pressure is needed to feel individual processes of the backbone. Individual ribs are not obvious. Fat cover over rump and tail head is palpable and visible in higher scores.
8, 9, 10	Good	Backbone is difficult or impossible to feel and ribs are well covered with spongy flesh and fat. Rump and tail head are full, and fat is visibly patchy. Brisket is full. Cattle would be approximately equivalent to fatness noted in slaughter cattle in Good to Prime grades.

The Effects of Seedling Size on Winter Injury and Stand Establishment

Livestock and Range Research Station
Miles City, Montana
R. S. White

The value of using introduced grass species to complement native forage production is widely recognized in the Northern Great Plains. Several species are available which can outyield native species and provide a source of high quality green forage when native species are less readily accepted. Establishment of improved pastures, however, frequently requires grazing to be deferred two years after seeding. Additional non-use may also be required with slower developing species or during years of below normal precipitation.

This study examines a way of shortening the deferment period so that seeded pastures can be used earlier. It investigates the advantages of late summer seeding to achieve additional seedling development. The study relates the amount of development to subsequent stand establishment, and it examines the effects of morphological development on winter injury.

Three species were studied: crested wheatgrass, Russian wildrye, and pubescent wheatgrass. Plots were sequentially seeded at two-week intervals between the last of August and the last of October, 1977. This resulted in seedling growth which varied from a single leaf to plants which had numerous tillers and leaves. The final planting was a dormant seeding that corresponded to the conventional way of seeding in the Northern Great Plains. Treatments were replicated four times.

After seedlings became dormant, individual plants were marked, and measurements made on the number of tillers, number of leaves, leaf length, leaf area, and seedling weight. During the 1978 growing season, observations were made on the same marked plants to determine: (1) amount of winter damage which had been sustained, (2) amount of spring growth that was achieved, and (3) the amount of fall regrowth that occurred after summer dormancy.

Several conclusions can be reached from preliminary analysis of the data. First, seedlings which reached a three-leaf or larger growth stage before fall dormancy were ready to be grazed after only three months of spring growth. This was especially dramatic with pubescent wheatgrass, but also held true in Russian wildrye and crested wheatgrass. Seedlings which achieved a one- or two-leaf stage before fall dormancy required a full season of deferment, while plots which were dormant seeded required additional non-use. Another conclusion from this study is that smaller plants are more vulnerable to winter injury. Seedlings in a three-leaf or larger growth stage are relatively unaffected by winter conditions, whereas smaller seedlings usually sustained some tissue damage. While outright mortality was relatively uncommon, winter tissue damage seemed to retard ensuing spring growth, and it placed seedlings in a less favorable competitive position.

From a management standpoint, my study illustrates the advantages of late summer seeding. Seedling size is increased prior to fall dormancy. This results in reduced winter tissue damage and it serves to shorten the deferment period.