

Technical Report No. 121  
PRELIMINARY ACTIVITIES AND RESULTS  
IN BISON RESEARCH ON THE PAWNEE SITE

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ABSTRACT

This report covers activities and preliminary results of the bison project during the period between September 1969 and early 1971. Data given herein pertain to that collected at the U.S. IBP Grassland Biome Site, Pawnee. A general outline for 1971 collections is given.

## ACQUISITION OF BISON

Twelve three-month-old bison calves were obtained from the Wichita Mountain Wildlife Refuge, Cache, Oklahoma during September 1969. The animals were shipped to the Colorado State University Metabolic and Surgical Laboratory in a four-horse trailer. The calves remained calm during the entire trip. An additional nine one-month-old calves were obtained during June 1970 from the same refuge in the same manner. Since the calves were transferred from one government agency to another, there was no purchase cost.

### Care and Training of Bison Calves

Proper facilities for handling bison are a prerequisite to success. It is essential to have high, strong fences and some kind of working chute. Bison cannot be handled adequately on lead. They readily jump their own height and can climb over fences in excess of one and one-half times their own height. Bison readily jump over cattle guards. The facilities at the Pawnee Site are adequate for handling bison if they are obtained as calves.

The use of choke-chain halters caused severe injury to young bison calves. Two-inch wide collars or halters are recommended.

Three-month-old bison could not be induced to take a bottle such that all handling required roping and upset the animals. One-month-old bison accepted bottle feeding reluctantly. In the process of nursing, they overcame much of their fear of being handled and brushed.

In order to conserve experimental pasture, the bison have been maintained on two-thirds grass hay and one-third supplement during periods when data was not being collected.

Training bison to carry fecal and esophageal diet collection harnesses and bags was no more difficult than that in the cattle studies at the Pawnee Site. However, unlike cattle, bison *must* be handled in a working chute. The collection equipment appears to have no adverse effect on grazing behavior in most bison. Two of our animals were incompatible with the collection equipment.

#### Medical Care

A certificate of health was required prior to interstate transport of bison. All of the animals received vaccinations for brucellosis and blackleg. The older calves were dehorned during April 1970, and the younger calves during September 1970. All male calves have been castrated.

Up to December 1970, cumulative mortality reached six animals. The following are probable causes of death:

- 2 calves - coccidiosis
- 2 calves - chronic and virulent pneumonia (shipping fever)
- 1 calf - unknown intestinal infection
- 1 yearling - died under general anaesthesia

#### Esophageal and Rumen Fistulation

To facilitate diet and digestibility studies, five bison have been esophageally fistulated while three have been ruminally fistulated. Dates of fistulation are:

| No. of Animals | Fistula Type    | Date           |
|----------------|-----------------|----------------|
| 3              | Rumen - 2 stage | May 1970       |
| 1              | Esophageal      | May 1970       |
| 2              | Esophageal      | September 1970 |
| 2              | Esophageal      | March 1971     |

One of the esophageally fistulated animals later died under anaesthesia. All of the older calves which still live are fistulated. The younger ones are being maintained for intake studies and will not be fistulated.

Dr. H. Gorman of the Colorado State University School of Veterinary Medicine has handled all tranquilizers and anaesthetics used during surgery.

#### PRELIMINARY DIET COMPOSITION DATA FOR SUMMER 1970

Mean botanical composition for bison diets sampled on light, moderate, and heavy grazing treatments are given in Table 1. No chemical composition estimates have been determined.

#### Total Intake

Preliminary intake estimates are given in Fig. 1. Total fecal collection and 70% digestion were used in calculating intake.

#### Digestibility of Forages in Bison

Table 2 gives a summary of the nylon bag digestibility data for summer 1970.

Table 1. Percent floristic composition of bison diet samples.

| Species | Date<br>of<br>Sampling | Source of Sample |                 |                  |                  |                 |                  |                             |
|---------|------------------------|------------------|-----------------|------------------|------------------|-----------------|------------------|-----------------------------|
|         |                        | Esophageal       |                 |                  | Fecal            |                 |                  |                             |
|         |                        | Light<br>Grazing | Mod.<br>Grazing | Heavy<br>Grazing | Light<br>Grazing | Mod.<br>Grazing | Heavy<br>Grazing | All<br>Pastures<br>Combined |
| Bogr    | 7/70<br>8/70           | 72<br>48         | 62<br>78        | 81<br>80         | 68               | 76              | 85               | 81                          |
| Arlo    | 7/70<br>8/70           | 0<br>7           | 5<br>1          | 1<br>2           | 0.4              | 0.5             | 3                | 0                           |
| Agsm    | 7/70<br>8/70           | 3<br>28          | 9<br>5          | 7<br>8           | 10               | 5               | 4                | 7                           |
| Spcr    | 7/70<br>8/70           | 6<br>2           | 8<br>3          | 1<br>2           | 7                | 10              | 6                | 7                           |
| Buda    | 7/70<br>8/70           | 7<br>3           | 8<br>5          | 6<br>5           | 0.4              | 1               | 1                | 0                           |
| Cahe    | 7/70<br>8/70           | 8<br>3           | 7<br>5          | 1<br>0.9         | 6                | 2               | 0.7              | 3                           |
| Stco    | 7/70<br>8/70           | 0<br>5           | 0<br>0          | 0.4<br>0.6       | 4                | 0               | 0                | 0.8                         |
| Feoc    | 7/70<br>8/70           | 0<br>0           | 0<br>0          | 0<br>0           | 0                | 0               | 0                | 0                           |
| Saka    | 7/70<br>8/70           | 0<br>0           | 0.7<br>0        | 0<br>0           | 0                | 0               | 0                | 0                           |
| Spcr    | 7/70<br>8/70           | 0<br>3           | 0.9<br>1        | 2<br>1           | 3                | 5               | 1                | 2                           |
| Others  | 7/70<br>8/70           | 4<br>2           | 0<br>0.7        | 0.6<br>0.7       | 2                | 0.2             | 0.5              | 0                           |

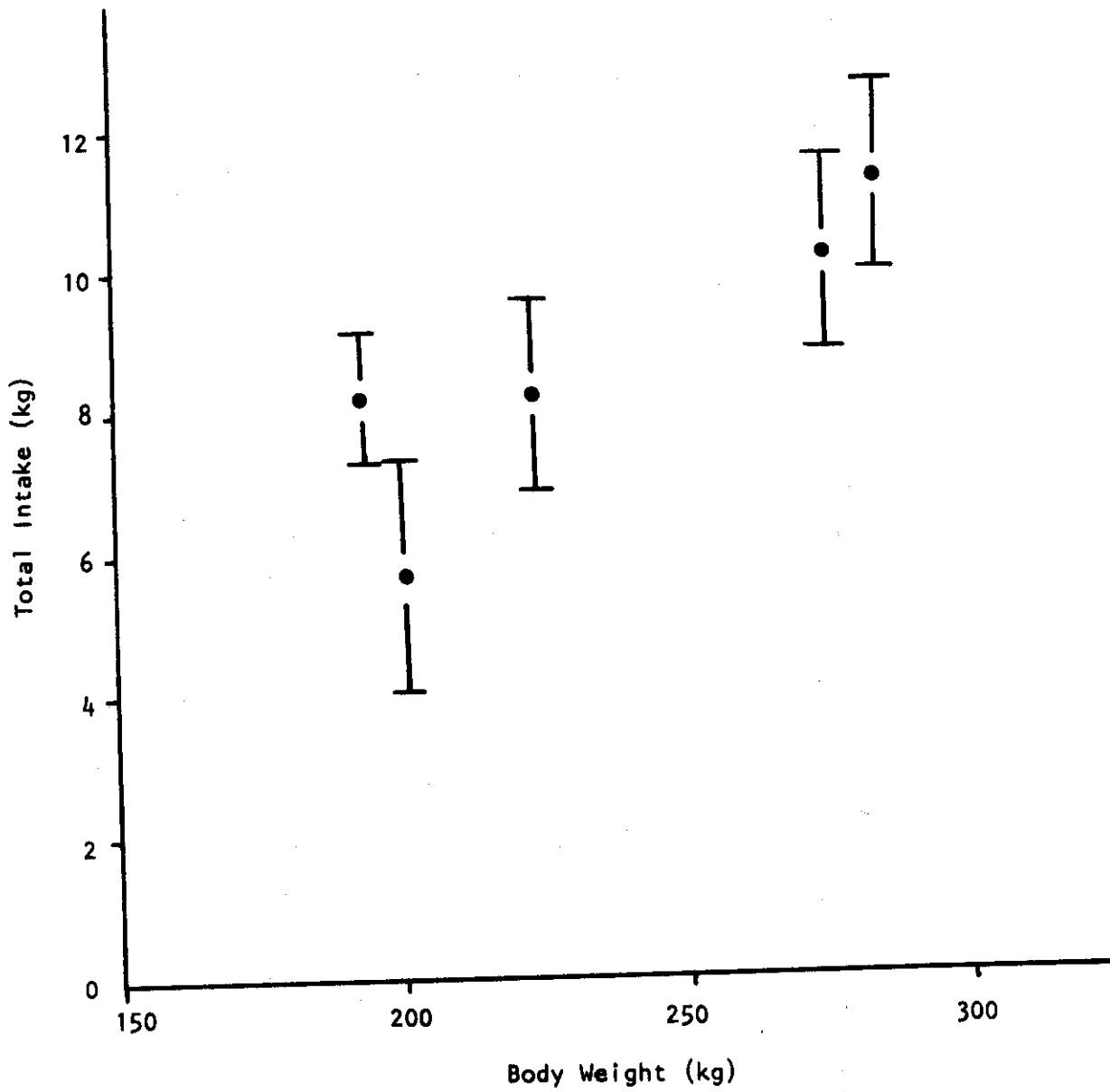


Fig. 1. Relation between total intake and bison weights. Dry weight consumed lies between 2.9% and 4.3% of live weight. (Means  $\pm$  standard deviation)



Table 2. Summary of dry matter digestion of July 1970 samples by nylon bag technique.

|                    | Bison #6 | Bison #7 | Bison #8 |
|--------------------|----------|----------|----------|
| Meadow hay stand   | 65 ± 5.5 | 76 ± 2.2 | 71 ± 4.8 |
| Blue grama         | 56 ± 4.8 | 75 ± 5.4 | 72 ± 5.6 |
| Buffalo grass      | 59 ± 2.4 | 68 ± 0.3 | 65 ± 3.3 |
| Western wheatgrass | 68 ± 4.2 | 74 ± 4.4 | 73 ± 2.8 |
| Snakeweed          | 77 ± 2.7 | 81 ± 0.6 | 80 ± 2.3 |
| Red threeawn       | 53 ± 8.4 | 65 ± 4.3 | 62 ± 6.1 |
| Sun sedge          | 65 ± 3.0 | 76 ± 1.0 | 68 ± 4.6 |
| Esophageal extrusa | 68 ± 6.6 | 75 ± 1.3 | 76 ± 3.8 |

#### 1970 DATA COLLECTION

The current data collection period spans the period between December 15, 1970 and December 15, 1971. During the period the following data will be collected on or near the specified dates in Table 3. The bison will be integrated into a factorial design eater-digester study during 1971. The levels of various independent variables can be seen in Fig. 1. Preliminary results suggest that bison select less digestible forage than cattle, but are better able to digest winter forage.

Intake estimates for bison will be obtained using the younger of the two age groups. Total fecal collection will be made on light grazed pasture between June 1971 and December 1971.

Table 3. Data to be collected on or near specified dates during period between December 15, 1970 and December 15, 1971. L = light grazing; M = moderate grazing; H = heavy grazing.

| Data Sets  | Dates                   |   |   |        |   |   |         |   |   |         |   |         |   |          |   |          |   |
|--|-------------------------|---|---|--------|---|---|---------|---|---|---------|---|---------|---|----------|---|----------|---|
|  | 12/15/70                |   |   | 3/1/71 |   |   | 3/25/72 |   |   | 6/25/71 |   | 8/20/71 |   | 10/15/71 |   | 12/15/71 |   |
|  | L                       | M | H | L      | H | L | M       | H | L | H       | L | H       | L | H        | L | H        |   |
| Diets:   |                         |   |   |        |   |   |         |   |   |         |   |         |   |          |   |          |   |
| Floristic composition                                | ✓                       | ✓ | ✓ | ✓      | ✓ | ✓ | ✓       | ✓ | ✓ | ✓       | ✓ | ✓       | ✓ | ✓        | ✓ | ✓        | ✓ |
| Cell wall constituents                               | ✓                       | ✓ | ✓ | ✓      | ✓ | ✓ | ✓       | ✓ | ✓ | ✓       | ✓ | ✓       | ✓ | ✓        | ✓ | ✓        | ✓ |
| Ash  | ✓                       | ✓ | ✓ | ✓      | ✓ | ✓ | ✓       | ✓ | ✓ | ✓       | ✓ | ✓       | ✓ | ✓        | ✓ | ✓        | ✓ |
| Nitrogen   | ✓                       | ✓ | ✓ | ✓      | ✓ | ✓ | ✓       | ✓ | ✓ | ✓       | ✓ | ✓       | ✓ | ✓        | ✓ | ✓        | ✓ |
| Behavior and location of diet collection in pastures |                         |   |   | ✓      | ✓ | ✓ | ✓       | ✓ | ✓ | ✓       | ✓ | ✓       | ✓ | ✓        | ✓ | ✓        | ✓ |
| Plant biomass  |                         |   |   | ✓      | ✓ |   |         |   | ✓ | ✓       | ✓ | ✓       | ✓ | ✓        | ✓ | ✓        | ✓ |
| -----  |                         |   |   |        |   |   |         |   |   |         |   |         |   |          |   |          |   |
| Digestibility Studies:                               |                         |   |   |        |   |   |         |   |   |         |   |         |   |          |   |          |   |
| Eaters:  |                         |   |   |        |   |   |         |   |   |         |   |         |   |          |   |          |   |
| Bison  | ✓                       | ✓ | ✓ | ✓      | ✓ | ✓ | ✓       | ✓ | ✓ | ✓       | ✓ | ✓       | ✓ | ✓        | ✓ | ✓        | ✓ |
| Cattle   | ✓                       | ✓ | ✓ | ✓      | ✓ | ✓ | ✓       | ✓ | ✓ | ✓       | ✓ | ✓       | ✓ | ✓        | ✓ | ✓        | ✓ |
| Sheep  |                         |   |   |        |   |   |         |   | ✓ | ✓       | ✓ | ✓       | ✓ | ✓        | ✓ | ✓        | ✓ |
| Antelope   |                         |   |   |        |   |   |         |   | ? | ?       |   |         |   |          |   |          |   |
| Digesters:   |                         |   |   |        |   |   |         |   |   |         |   |         |   |          |   |          |   |
| Bison  | } dry lot-<br>grass hay |   |   |        | ✓ |   |         |   | ✓ | ✓       | ✓ | ✓       | ✓ | ✓        | ✓ | ✓        | ✓ |
| Cattle   |                         |   |   |        | ✓ |   |         |   | ✓ | ✓       | ✓ | ✓       | ✓ | ✓        | ✓ | ✓        | ✓ |
| Sheep  |                         |   |   |        |   |   |         |   |   |         |   |         |   |          |   |          |   |