the material being threshed passes between the cylinder and concave. The clearance between the cylinder and concave should be approximately 1/2" in front and 1/4" in back. These settings will perhaps have to be modified somewhat according to field conditions encountered. Decreasing the clearance will more thoroughly remove seeds from heads but will also break up straw more, using more power and possibly resulting in more seed damage. The best machine setting for seed removal may not be a good setting for minimizing seed damage, so a compromise is required.

Chaffer sieve and fan adjustments are closely related. Sufficient air must be supplied by the fan to remove chaff and straw without blowing kernels over the shoe. Set the chaffer 1/2 to 2/3 open and the lower sieve 1/3 to 1/2 open for observation. If excessive straw and chaff are reaching the grain tank, closer settings should be tried. If the chaffer is not opened wide enough however, too much grain may appear in the tailings or be lost out the back of the shoe.

Continuous evaluation of losses and observation of the condition of the grain in the tank is necessary to determine adjustments that may be necessary. An experienced combine operator will keep losses to a minimum and harvest a maximum crop.

# Use of Forage Crops for Livestock Production in Arizona

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## Summary

The principal factors limiting yield of forage crops in Arizona are usually water and nitrogen for grasses and for legumes, water and phosphorus. Management skill is also essential, especially for production and grazing of irrigated pastures. Maximum profit can only be realized by carefully blending all production and utilization factors.

Carrying capacities for planning purposes can be determined by using projected yields of dry matter forage per acre and estimates concerning feed requirements. The discussion that follows assumes that feed consumption for an animal unit (1000 pound animal or its equivalent) would be the equivalent of 22 pounds of air dry feed (10% moisture) per day.

## Computation of Feed Requirement

The approximate feed requirement for other size animals would be as follows:

450 lb. calves - 12 lbs.
600 lb. cattle - 15 lbs.
850 lb. cattle - 20 lbs.
165 lb. ewes - 4.5 lbs.

The amount of forage used by immature animals is slightly higher proportionally, as reflected in the 600 lb. figure for cattle. These estimates do not equate with feedlot consumption figures. The estimates should be considered as guides for determining carrying capacities somewhat above maintenance. To achieve maximum gains, animals will need supplementary feed, usually extra energy such as grain.

Perhaps the most important variable for projecting carrying capacities is forage yield. In the tables that follow three different yield levels have been assumed. Select the yield level most nearly correct for the situation under consideration.

## Permanent Pasture

Warm season grasses such as bermudagrass and Blue panicgrass are used for much of the irrigated land at the lower elevations. Alfalfa is an excellent legume for pasture, but there is always the danger of bloat, and it requires special management (see Bull. A16). At the higher elevations, cool season grasses such as Tall fescuegrass and Tall Wheatgrass are better adapted (See Q 420, "Establishment of perennial irrigated pastures" and Q 421, "Management of perennial irrigated pastures").

Tables to Facilitate Estimates at Elevations of 2000 to 3000 feet.

Table 1. Estimates Concerning Use of Warm and Cool Season Grasses for Permanent Pasture.

| Annual Yield 1/ (lbs/acre) | Animal Units 2/ Per Acre (220 days) | Water Applied 3/ (Acre Feet Per Acre) |
|---|---|---|
| 8,000 | 1.7 | 4.5 |
| 10,000 | 2.1 | 5.5 |
| 12,000 | 2.5 | 6.5 |

1/ Air dry forage actually consumed by animals. Grass contains 70 or more percent moisture depending upon stage of maturity, time of year and other factors.

2/ 4/10 to 11/15. Assumes animals weighing 1,000 pounds for 220-day period, consuming 22 pounds dry-matter daily.

3/ Will vary because of irrigation efficiency and other factors.

Winter Pasture

Ryegrass, barley, oats, wheat and rye may be used to provide winter pasture.

Table 2. Estimates Concerning the Use of Winter Pasture.

| Yield 1/ (lbs/A) | Animal Units/A. 2/ | Water Applied 3/ (Acre Feet Per Acre) |
|---|---|---|
| 4,000 | 1.3 | 2.5 |
| 5,000 | 1.7 | 3.0 |
| 6,000 | 2.0 | 3.5 |

1/ Air dry forage actually consumed by animals.

2/ 11/15 to 4/10. Assumes animals weighing 1,000 pounds, consuming 22 pounds dry-matter daily. Use of supplemental grain or silage would increase animal units per acre.

3/ Actual amount required may vary greatly from these values.

Silage

Forage sorghum, corn or other crops may be used to provide silage, usually for winter feeding.

Table 3. Estimates Concerning Use of Sorghum or Corn for Silage Feed.

| Annual Yield 1/ (Tons/Acre) | Animal Units 2/ Per Acre | Water Applied 3/ (Acre Feet Per Acre) |
|---|---|---|
| 4 | Alfalfa will be | 3.5 |
| 6 | used to supplement | 5.0 |
| 8 | pasture and silage | 6.5 |

1/ Air dry forage harvested as hay. After storage for 60 days it will probably contain about 8% moisture. Many factors affect the rate of drying and the final equilibrium moisture achieved.

2/ Assumes animals weighing 1,000 pounds consuming about 22 pounds air dry feed daily for 8-month period.

3/ Will vary because of irrigation efficiency and other factors.

## Solving a Practical Problem Concerning the Number of Animal Units that May Be Supported

### Assumptions

1. 1,400 acre feet of water available annually
2. 70% delivery efficiency of irrigation water
3. Use of intermediate level of production

### Animal Units

| 1. Livestock feed Crop | Acres | (About 7½ months) Water Use (Acre feet) | Animal Units |
|---|---|---|---|
| Permanent pasture | 110 | 550 | 230 |
| Alfalfa (for hay) | 40 | 200 | 100 |
| | | | 330 |

| 2. Livestock feed Crop | Acres | (About 4½ months) Water Use (Acre feet) | Animal Units |
|---|---|---|---|
| Alfalfa (for hay) | 40 | 200 | 150 |
| Ryegrass, barley, oats, wheat or rye | 30 | 90 | 50 |
| Silage 1/ | 30 | 135 | 130 |
| | | | 330 2/ |

1/ Double crop. At the lower elevations, an alternative is to plant a dual purpose sorghum about March 15. Use first crop for grain and second crop for forage.

2/ Deficiency to be met with purchased feed, grazing of permanent pasture, or sorghum grain in alternate years on fallow land receiving a minimum of water.

| Total acres used: | | |
|---|---|---|
| | Permanent pasture | 110 |
| | Alfalfa | 80 |
| | Silage and winter pasture | 30 |
| | | 220 acres |

The 220 acres supported 330 animal units for a full 12 months = 1½ animal units per acre per year.

### Increasing Animal Units

The number of animal units could be increased by:

1. Produce higher crop yields.
2. More efficient use of water than estimated. (A larger area could be irrigated.)
3. Use of supplementary feed.
4. Improving pasture use efficiency.
5. Controlling parasites and providing shade to increase animal efficiency.

### Estimates for Other Parts of Arizona

The pasture season tends to longer for lower and shorter for higher elevations of Arizona. The tables and practical problem have been prepared primarily for land at 2000-3000 feet elevation. However, with slight modification these data may be used at other elevations of the state.