Evaluation of Pasture Forage and Harvested Forage Types during the Early Lactation Production Period

Results

The early lactation production period was 45 days during early spring from mid March to late April. The early lactation production period has the greatest nutritional requirements of the production periods because the birth of the calf initiates production of increasing amounts of milk and the reproductive organs require repair and pre-conditioning to promote the rapid onset of the estrus cycle. Cows gaining weight during this period will produce milk in quantities at or near the animals' genetic potential. Cows increasing in body condition will have adequate time to complete at least one estrus cycle prior to the start of the breeding season; this rapid recovery improves the percentage of cows that conceive in the first cycle of the breeding season (BCRC 1999). Feeding forages containing insufficient nutrients during this period causes a reduced cow body condition that results in milk production at levels below the animals' genetic potential and in a delayed onset of estrual activity so that the period between calving and the first estrus cycle is lengthened and conception rates in the cow herd are reduced. Pasture forage and harvested forage costs and returns after feed costs were determined for a 1200-pound range cow during the early lactation production period. The cow requires a daily intake of 27 lbs dry matter (DM) at 10.1% crude protein (CP) (2.73 lbs CP/day).

Pasture Forage Types

Reserved native rangeland managed as a repeated seasonal pasture was evaluated during the early lactation production period for 45 days between mid March and late April (tables 28 and 31). Forage on native rangeland pasture during early spring has a crude protein content of around 9.2%. Early spring native rangeland forage has pasture rent value or production costs of $8.76 per acre, forage dry matter costs of $140.16 per ton, and crude protein costs of $0.76 per pound. A cow grazing during the early lactation period would require 10.80 acres (7.32 acres per month) at a forage cost of $94.64 per production period. The crude protein content of early spring native rangeland forage is below the requirements of a cow during early lactation, however, crude protein was not supplemented. Total feed costs would be $94.64 per period, or $2.10 per day (table 32). Calf weight gain was assumed to be 1.80 lbs per day; accumulated weight gain was 81.0 lbs. When calf accumulated weight was assumed to have a value of $0.70 per pound, the gross return was $56.70 per calf, and the net returns after pasture costs were a loss of $37.94 per cow-calf pair and a loss of $3.51 per acre. The cost of calf weight gain was $1.17 per pound (table 33).

Harvested Forage Types

Crested wheatgrass hay cut late, at a mature plant stage, has a crude protein content of around 6.4%. This crested wheatgrass hay has production costs of $28.11 per acre, forage dry matter costs of $34.80 per ton, and crude protein costs of $0.28 per pound. Mature crested wheatgrass hay would be fed at 27.0 lbs DM/day to provide 1.7 lbs CP/day. The nutrient content of mature crested wheatgrass hay is below the dietary requirements of a cow during early lactation. An additional 1.0 lb of crude protein per day would need to be provided, at a cost of $13.50 per period. Production of mature crested wheatgrass hay to feed during the early lactation period (tables 28 and 31) would require 0.76 acres, and the forage would cost $21.38 per production period. Total forage and supplement costs would be $34.91 per period, or $0.78 per day (table 32). Calf weight gain was assumed to be 1.90 lbs per day; accumulated weight gain was 85.5 lbs. When calf accumulated weight was assumed to have a value of $0.70 per pound, the gross return was $59.85 per calf, and the net returns after feed costs were $24.94 per cow-calf pair and $32.82 per acre. The cost of calf weight gain was $0.41 per pound (table 33).

Crested wheatgrass hay cut early, at the boot stage, has a crude protein content of around 14.5%. This crested wheatgrass hay has production costs of $26.50 per acre, forage dry matter costs of $40.80 per ton, and crude protein costs of $0.14 per pound. Early cut crested wheatgrass hay would be fed at 18.8 lbs DM/day to provide 2.7 lbs CP/day. An additional 8.2 lbs of roughage per day would need to be provided, at a cost of $6.43 per period. Production of early cut crested wheatgrass hay to feed during the early lactation period (tables 28 and 31) would require 0.65 acres, and the forage would cost $17.10 per production period. Total forage and supplement costs would be $23.53 per period, or $0.52 per day (table 32). Calf weight gain was assumed to be 1.90 lbs per day; accumulated weight gain was 85.5 lbs. When calf accumulated weight was assumed to have a value of $0.70 per pound, the gross return was $59.85 per calf, and the net returns after feed costs were $36.32 per cow-calf pair

and $55.88 per acre. The cost of calf weight gain was $0.28 per pound (table 33).

Forage barley hay cut early, at the milk stage, has a crude protein content of 13.0%. This forage barley hay has production costs of $68.21 per acre, forage dry matter costs of $28.80 per ton, and crude protein costs of $0.11 per pound. Early cut forage barley hay would be fed at 21.0 lbs DM/day to provide 2.7 lbs CP/day. An additional 6.0 lbs of roughage per day would need to be provided, at a cost of $4.73 per period. Production of early cut forage barley hay to feed during the early lactation period (tables 29 and 31) would require 0.20 acres, and the forage would cost $13.50 per production period. Total forage and supplement costs would be $18.23 per period, or $0.41 per day (table 32). Calf weight gain was assumed to be 1.90 lbs per day; accumulated weight gain was 85.5 lbs. When calf accumulated weight was assumed to have a value of $0.70 per pound, the gross return was $59.85 per calf, and the net returns after feed costs were $41.62 per cow-calf pair and $208.10 per acre. The cost of calf weight gain was $0.21 per pound (table 33).

Forage barley hay cut late, at the hard dough stage, has a crude protein content of 9.2%. This forage barley hay has production costs of $70.35 per acre, forage dry matter costs of $27.40 per ton, and crude protein costs of $0.15 per pound. Late-cut forage barley hay would be fed at 27.0 lbs DM/day to provide 2.48 lbs CP/day. An additional 0.25 lbs of crude protein per day would need to be provided, at a cost of $3.38 per period. Production of late-cut forage barley hay to feed during the early lactation period (tables 29 and 31) would require 0.24 acres, and the forage would cost $16.65 per production period. Total forage and supplement costs would be $20.03 per period, or $0.45 per day (table 32). Calf weight gain was assumed to be 1.90 lbs per day; accumulated weight gain was 85.5 lbs. When calf accumulated weight was assumed to have a value of $0.70 per pound, the gross return was $59.85 per calf, and the net returns after feed costs were $39.82 per cow-calf pair and $165.92 per acre. The cost of calf weight gain was $0.23 per pound (table 33).

Oat forage hay cut early, at the milk stage, has a crude protein content of 11.5%. This oat forage hay has production costs of $69.17 per acre, forage dry matter costs of $29.60 per ton, and crude protein costs of $0.13 per pound. Early cut oat hay would be fed at 23.7 lbs DM/day to provide 2.7 lbs CP/day. An additional 3.3 lbs of roughage per day would need to be provided, at a cost of $2.60 per period. Production of early cut oat hay to feed during the early lactation period (tables 29 and 31) would require 0.23 acres, and the forage would cost $15.75 per production period. Total forage and supplement costs would be $18.35 per period, or $0.41 per day (table 32). Calf weight gain was assumed to be 1.90 lbs per day; accumulated weight gain was 85.5 lbs. When calf accumulated weight was assumed to have a value of $0.70 per pound, the gross return was $59.85 per calf, and the net returns after feed costs were $41.50 per cow-calf pair and $180.43 per acre. The cost of calf weight gain was $0.21 per pound (table 33).

Oat forage hay cut late, at the hard dough stage, has a crude protein content of 7.8%. This oat forage hay has production costs of $74.53 per acre, forage dry matter costs of $26.40 per ton, and crude protein costs of $0.17 per pound. Late-cut oat hay would be fed at 27.0 lbs DM/day to provide 2.1 lbs CP/day. An additional 0.62 lbs of crude protein per day would need to be provided, at a cost of $8.37 per period. Production of late-cut oat hay to feed during the early lactation period (tables 29 and 31) would require 0.21 acres, and the forage would cost $16.04 per production period. Total forage and supplement costs would be $24.41 per period, or $0.54 per day (table 32). Calf weight gain was assumed to be 1.90 lbs per day; accumulated weight gain was 85.5 lbs. When calf accumulated weight was assumed to have a value of $0.70 per pound, the gross return was $59.85 per calf, and the net returns after feed costs were $35.44 per cow-calf pair and $168.76 per acre. The cost of calf weight gain was $0.29 per pound (table 33).

Pea forage hay cut at an early plant stage has a crude protein content of 18.9%. This pea forage hay has production costs of $79.96 per acre, forage dry matter costs of $55.00 per ton, and crude protein costs of $0.15 per pound. Early cut pea forage hay would be fed at 14.4 lbs DM/day to provide 2.7 lbs CP/day. An additional 12.6 lbs of roughage per day would need to be provided, at a cost of $9.92 per period. Production of early cut pea forage hay to feed during the early lactation period (tables 30 and 31) would require 0.23 acres, and the forage would cost $18.45 per production period. Total forage and supplement costs would be $28.37 per period, or $0.63 per day (table 32). Calf weight gain was assumed to be 1.90 lbs per day; accumulated weight gain was 85.5 lbs. When calf accumulated weight was assumed to have a value of $0.70 per pound, the gross return was $59.85 per calf, and the net returns after feed costs were $31.48 per cow-calf pair and $136.87 per acre. The cost of calf weight gain was $0.33 per pound (table 33).

Pea forage hay cut at a late plant stage has a crude protein content of 14.4%. This pea forage hay has

production costs of $86.87 per acre, forage dry matter costs of $37.40 per ton, and crude protein costs of $0.13 per pound. Late-cut pea forage hay would be fed at 19.0 lbs DM/day to provide 2.7 lbs CP/day. An additional 8.0 lbs of roughage per day would need to be provided, at a cost of $6.30 per period. Production of late-cut pea forage hay to feed during the early lactation period (tables 30 and 31) would require 0.18 acres, and the forage would cost $15.75 per production period. Total forage and supplement costs would be $22.05 per period, or $0.49 per day (table 32). Calf weight gain was assumed to be 1.90 lbs per day; accumulated weight gain was 85.5 lbs. When calf accumulated weight was assumed to have a value of $0.70 per pound, the gross return was $59.85 per calf, and the net returns after feed costs were $37.80 per cow-calf pair and $210.00 per acre. The cost of calf weight gain was $0.26 per pound (table 33).

Forage lentil hay cut at an early plant stage has a crude protein content of 21.8%. This forage lentil hay has production costs of $59.69 per acre, forage dry matter costs of $71.60 per ton, and crude protein costs of $0.17 per pound. Early cut forage lentil hay would be fed at 12.5 lbs DM/day to provide 2.7 lbs CP/day. An additional 14.5 lbs of roughage per day would need to be provided, at a cost of $11.42 per period. Production of early cut forage lentil hay to feed during the early lactation period (tables 30 and 31) would require 0.34 acres, and the forage would cost $20.70 per production period. Total forage and supplement costs would be $32.12 per period, or $0.71 per day (table 32). Calf weight gain was assumed to be 1.90 lbs per day; accumulated weight gain was 85.5 lbs. When calf accumulated weight was assumed to have a value of $0.70 per pound, the gross return was $59.85 per calf, and the net returns after feed costs were $27.73 per cow-calf pair and $81.56 per acre. The cost of calf weight gain was $0.38 per pound (table 33).

Forage lentil hay cut at a late plant stage has a crude protein content of 14.7%. This forage lentil hay has production costs of $71.48 per acre, forage dry matter costs of $37.00 per ton, and crude protein costs of $0.13 per pound. Late-cut forage lentil hay would be fed at 18.6 lbs DM/day to provide 2.7 lbs CP/day. An additional 8.4 lbs of roughage per day would need to be provided, at a cost of $6.62 per period. Production of late-cut forage lentil hay to feed during the early lactation period (tables 30 and 31) would require 0.22 acres, and the forage would cost $15.75 per production period. Total forage and supplement costs would be $22.37 per period, or $0.50 per day (table 32). Calf weight gain was assumed to be 1.90 lbs per day; accumulated weight gain was 85.5 lbs. When calf accumulated weight was assumed to have a value of $0.70 per pound, the gross return was $59.85 per calf, and the net returns after feed costs were $37.48 per cow-calf pair and $170.36 per acre. The cost of calf weight gain was $0.26 per pound (table 33).

Oat-pea forage hay has a crude protein content of 12.5%. This oat-pea forage hay has production costs of $95.52 per acre, forage dry matter costs of $37.20 per ton, and crude protein costs of $0.16 per pound. Oat-pea forage hay would be fed at 21.8 lbs DM/day to provide 2.7 lbs CP/day. An additional 5.2 lbs of roughage per day would need to be provided, at a cost of $4.10 per production period. Production of oat-pea forage hay to feed during the early lactation period (tables 30 and 31) would require 0.19 acres, and the forage would cost $18.45 per production period. Total forage and supplement costs would be $22.55 per period, or $0.50 per day (table 32). Calf weight gain was assumed to be 1.90 lbs per day; accumulated weight gain was 85.5 lbs. When calf accumulated weight was assumed to have a value of $0.70 per pound, the gross return was $59.85 per calf, and the net returns after feed costs were $37.30 per cow-calf pair and $196.32 per acre. The cost of calf weight gain was $0.26 per pound (table 33).

Discussion

Pasture Forage Types

Reserved native rangeland forage grazed as a repeated seasonal pasture during the early lactation production period was high-cost forage because the quantities of crude protein captured per acre were low and the quantity of forage dry matter available per acre was very low. Total forage costs for reserved native rangeland pastures was high, even though the equipment costs, labor costs, land rent per acre, and forage production costs per acre were low, because the input costs do not directly regulate livestock forage feed costs. The cost per pound of crude protein ($0.76/lb CP) was very high because the quantity of crude protein captured per acre was low. The crude protein content of the forage was below the requirements of a lactating cow, however, crude protein was not supplemented. The forage dry matter cost ($140.16/ton) was excessively high because the quantity of forage weight per acre was extremely low. The low forage weight per acre made it necessary to use about three times the land area that would have been needed during the summer period to provide a cow with adequate forage dry matter for a month in the same pasture. The large land area (10.80 acres) per cow caused the forage costs per period to be very high. The total daily forage feed costs

($2.10/day) were extremely high. The total feed costs were greater than the low market value of the accumulated calf weight causing a very high loss in returns after feed costs ($-37.94) per cow and a moderate loss in returns after feed costs ($-3.50) per acre. The cost per pound of calf weight gain ($1.17/lb) was very high because of the low forage dry matter yields per acre, the low crude protein content in the forage, and the large land area per cow-calf pair.

Harvested Forage Types

Crested wheatgrass hay cut at a mature growth stage and fed during the early lactation production period was moderate-cost forage. The forage dry matter cost ($34.80/ton) was moderate for mature crested wheatgrass hay and lower than the forage dry matter cost per ton for early cut crested wheatgrass hay because greater dry matter weight of the mature crested wheatgrass hay was harvested per acre. The cost per pound of crude protein ($0.28/lb CP) was high for mature crested wheatgrass hay and double the cost per pound of crude protein for early cut crested wheatgrass hay because of the lower crude protein weight in the mature crested wheatgrass hay harvested per acre. The land area (0.76 acres) per cow for mature crested wheatgrass hay was small but greater than the land area required per cow for early cut crested wheatgrass hay because of the greater crude protein weight per acre in the early cut crested wheatgrass hay. The crude protein content of the mature crested wheatgrass forage was below the requirements of a lactating cow making it necessary to provide purchased supplemental crude protein. The total daily forage and supplemental crude protein costs ($0.78/day) were high because the total supplement crude protein costs were high. The total feed costs were lower than the low market value of the accumulated calf weight resulting in moderate returns after feed costs ($24.94) per cow and ($32.82) per acre. The cost per pound of calf weight gain ($0.41/lb) was moderate because of the additional supplemental crude protein costs that were needed because mature crested wheatgrass hay did not meet the nutrient requirements of lactating range cows.

Crested wheatgrass hay cut at the boot growth stage and fed during the early lactation production period was moderate-cost forage. The forage dry matter cost ($40.80/ton) was moderate for early cut crested wheatgrass hay and was greater than the forage dry matter cost per ton for mature crested wheatgrass hay because crested wheatgrass hay cut at the boot stage harvested lower forage dry matter weight per acre than crested wheatgrass hay cut at a mature growth stage. The cost per pound of crude protein ($0.14/lb CP) was low for early cut crested wheatgrass hay and lower than the cost per pound of crude protein for mature crested wheatgrass hay because of the greater crude protein weight in the early cut crested wheatgrass hay harvested per acre. The land area (0.65 acres) per cow for early cut crested wheatgrass hay was small and less than the land area required per cow for mature crested wheatgrass hay because of the greater crude protein weight harvested per acre in the early cut crested wheatgrass hay. The forage cost of early cut crested wheatgrass hay was low but the total daily forage feed cost ($0.52/day) was moderate because slightly less than a third of the ration forage was supplemental roughage which added substantially to the total forage feed costs. The total feed costs were lower than the low market value of the accumulated calf weight resulting in moderate returns after feed costs ($36.32) per cow and in high returns after feed costs ($55.88) per acre. The cost per pound of calf weight gain ($0.28/lb) was low because of the low cost per pound of crude protein and the small land area per cow-calf pair.

Forage barley hay cut at the milk growth stage and fed during the early lactation production period was low-cost forage. The production costs per acre were high for early cut forage barley hay because the equipment costs, labor costs, and land rent per acre were high. The forage dry matter cost ($28.80/ton) was low because of the high forage dry matter production. The cost per pound of crude protein ($0.11/lb CP) was low because of the high crude protein weight contained in the forage. The land area (0.20 acres) per cow was very small because of the high crude protein and high forage dry matter yields per acre. The total daily forage and supplemental roughage costs ($0.41/day) were low because of the low cost of crude protein per pound and the very small land area per cow. The total feed costs were lower than the low market value of the accumulated calf weight resulting in high returns after feed costs ($41.62) per cow and in extremely high returns after feed costs ($208.10) per acre. The cost per pound of calf weight gain ($0.21/lb) was very low because of the low cost per pound of crude protein and the very small land area per cow-calf pair.

Forage barley hay cut at the hard dough growth stage and fed during the early lactation production period was low-cost forage. The production costs per acre were high for late cut forage barley hay because the equipment costs, labor costs, and land rent per acre were high. The forage dry matter cost ($27.40/ton) was low because of the high forage dry matter production. The cost per pound of crude protein ($0.15/lb CP) was low because of the high crude protein weight contained in the forage. The cost per pound of crude protein for

late cut forage barley hay was greater than the cost per pound of crude protein for early cut forage barley hay because of the lower crude protein weight harvested per acre in the late cut forage barley hay. The land area (0.24 acres) per cow was very small because of the high crude protein and high forage dry matter yields per acre. The total daily forage and supplemental roughage costs ($0.45/day) were low because of the low cost of crude protein per pound and the very small land area per cow. The total feed costs were lower than the low market value of the accumulated calf weight resulting in high returns after feed costs ($39.82) per cow and in very high returns after feed costs ($165.92) per acre. The cost per pound of calf weight gain ($0.23/lb) was very low because of the low cost per pound of crude protein and the very small land area per cow-calf pair.

Oat forage hay cut at the milk growth stage and fed during the early lactation production period was low-cost forage. The production costs per acre were high for early cut oat forage hay because the equipment costs, labor costs, and land rent per acre were high. The forage dry matter cost ($29.60/ton) was low because of the high forage dry matter production. The cost per pound of crude protein ($0.13/lb CP) was low because of the high crude protein weight contained in the forage. The land area (0.23 acres) per cow was very small because of the high crude protein and high forage dry matter yields per acre. The total daily forage and supplemental roughage costs ($0.41/day) were low because of the low cost of crude protein per pound and the very small land area per cow. The total feed costs were lower than the low market value of the accumulated calf weight resulting in high returns after feed costs ($41.50) per cow and in very high returns after feed costs ($180.43) per acre. The cost per pound of calf weight gain ($0.21/lb) was very low because of the low cost per pound of crude protein and the very small land area per cow-calf pair .

Oat forage hay cut at the hard dough growthstage and fed during the early lactation production period was low-cost forage. The production costs per acre were high for late cut oat forage hay because the equipment costs, labor costs, and land rent per acre were high. The forage dry matter cost ($26.40/ton) was low because of the high forage dry matter production. The cost per pound of crude protein ($0.17/lb CP) was low because of the high crude protein weight contained in the forage. The cost per pound of crude protein for late cut oat forage hay was greater than the cost per pound of crude protein for early cut oat forage hay because of the lower crude protein weight harvested per acre in the late cut oat forage hay. The land area (0.21 acres) per cow was small because of the high forage dry matter yield per acre. The crude protein content of the forage was below the requirements of a lactating cow making it necessary to provide purchased supplemental crude protein. The total daily forage and supplemental crude protein costs ($0.54/day) were moderate because of the high cost of the supplemental crude protein. The total feed costs were lower than the low market value of the accumulated calf weight resulting in high returns after feed costs ($35.44) per cow and in very high returns after feed costs ($168.76) per acre. The cost per pound of calf weight gain ($0.29/lb) was low because of the very small land area per cow-calf pair.

Pea forage hay cut at an early growth stage and fed during the early lactation production period was moderate-cost forage. However, pea forage hay cut at a late growth stage has lower forage feed costs and greater revenue returns after feed costs than early cut pea forage hay. The production costs per acre were high for early cut pea forage hay because the equipment costs, labor costs, seed costs, and land rent per acre were high. The forage dry matter cost ($55.00/ton) was high because of the modest forage dry matter production. The cost per pound of crude protein ($0.15/lb CP) was low because of the high crude protein weight contained in the forage. The land area (0.23 acres) per cow was very small because of the high crude protein yield per acre. The total daily forage and supplemental roughage costs ($0.63/day) were moderate because of the high supplemental roughage costs and the modest forage dry matter production per acre. The total feed costs were lower than the low market value of the accumulated calf weight resulting in moderate returns after feed costs ($31.48) per cow and in very high returns after feed costs ($136.87) per acre. The cost per pound of calf weight gain ($0.33/lb) was moderately low because of the modest forage dry matter production per acre and the high supplemental roughage costs.

Pea forage hay cut at a late growth stage and fed during the early lactation production period was low-cost forage. Late cut pea forage hay has lower forage feed costs and greater revenue returns after feed costs than early cut pea forage hay. The production costs per acre were high for late cut pea forage hay because the equipment costs, labor costs, seed costs, and land rent per acre were high. The forage dry matter cost ($37.40/ton) was moderate because of the high forage dry matter production. The cost per pound of crude protein ($0.13/lb CP) was low because of the high crude protein weight contained in the forage. The land area (0.18 acres) per cow was very small because of the high crude protein and high forage dry matter yields per acre. The total daily forage and supplemental roughage

costs ($0.49/day) were low because of the low cost of crude protein per pound, the high forage dry matter production per acre, and the very small land area per cow. The total feed costs were lower than the low market value of the accumulated calf weight resulting in high returns after feed costs ($37.80) per cow and in extremely high returns after feed costs ($210.00) per acre. The cost per pound of calf weight gain ($0.26/lb) was low because of the low cost per pound of crude protein, the high forage dry matter production per acre, and the very small land area per cow-calf pairs.

Forage lentil hay cut at an early growth stage and fed during the early lactation production period was low-cost forage. However, forage lentil hay cut at a late growth stage has lower forage feed costs and greater revenue returns after feed costs than early cut forage lentil hay. The production costs per acre were high for early cut forage lentil hay because the equipment costs, labor costs, and land rent per acre were high. The forage dry matter cost ($71.60/ton) was high because of the modest forage dry matter yield per acre. The cost per pound of crude protein ($0.17/lb CP) was low because of the high crude protein weight contained in the forage. The land area (0.34 acres) per cow was small because of the high crude protein yield per acre. The total daily forage and supplemental roughage costs ($0.71/day) were high because of the high supplemental roughage costs and the modest forage dry matter production per acre. The total feed costs were lower than the low market value of the accumulated calf weight resulting in moderate returns after feed costs ($27.73) per cow and in high returns after feed costs ($81.56) per acre. The cost per pound of calf weight gain ($0.38/lb) was moderately low because of the modest forage dry matter production per acre and the high supplemental roughage costs.

Forage lentil hay cut at a late growth stage and fed during the early lactation production period was low-cost forage. Late cut forage lentil hay has lower forage feed costs and greater revenue returns after feed costs than early cut forage lentil hay. The production costs per acre were high for late cut forage lentil hay because the equipment costs, labor costs, and land rent per acre were high. The forage dry matter cost ($37.00/ton) was moderate because of the high forage dry matter production. The cost per pound of crude protein ($0.13/lb CP) was low because of the high crude protein weight contained in the forage. The land area (0.22 acres) per cow was very small because of the high crude protein and high forage dry matter yields per acre. The total daily forage and supplemental roughage costs ($0.50/day) were low because of the low cost of crude protein per pound, the high forage dry matter production per acre, and the very small land area per cow. The total feed costs were lower than the low market value of the accumulated calf weight resulting in high returns after feed costs ($37.48) per cow and in very high returns after feed costs ($170.36) per acre. The cost per pound of calf weight gain ($0.26/lb) was low because of the low cost per pound of crude protein, the high forage dry matter production per acre, and the very small land area per cow-calf pair.

Oat-pea hay cut at compromised plant growth stages and fed during the early lactation production period was low-cost forage. However, seeding oat forage separately on half of the field and cutting it at an early growth stage and seeding pea forage separately on half of the field and cutting it at a late growth stage will result in lower production costs per acre, lower forage dry matter costs per ton, lower costs per pound of crude protein, lower total forage feed costs per day, lower costs per pound of calf weight gain, greater net returns after feed costs per cow, and greater net returns after feed costs per acre than oat-pea forage seeded together and cut at compromised growth stages. The production costs per acre were very high for oat-pea hay because the equipment costs, labor costs, seed costs, and land rent per acre were high. The forage dry matter cost ($37.20/ton) was moderate because of the high forage dry matter production per acre. The cost per pound of crude protein ($0.16/lb CP) was low because of the high crude protein weight contained in the forage. The land area (0.19 acres) per cow was very small because of the high crude protein and high forage dry matter yields per acre. The total daily forage and supplemental roughage costs ($0.50/day) were low because of the low cost of crude protein per pound, the high forage dry matter production per acre, and the very small land area per cow. The total feed costs were lower than the low market value of the accumulated calf weight resulting in high returns after feed costs ($37.30) per cow and extremely high returns after feed costs ($196.32) per acre. The cost per pound of calf weight gain ($0.26/lb) was low because of the low cost per pound of crude protein, the high forage dry matter production per acre, and the very small land area per cow-calf pair.

Table 28. Costs and returns for pasture forage types and perennial grass harvested forage types to be fed to range cows during the 45-day early lactation production period.

		Native Rangeland Repeated Seasonal	Crested Wheatgrass Hay	Crested Wheatgrass Hay
Days		45	45	45
Growth Stage		Early Spring	Mature	Boot Stage
Herbage Weight	lb/ac	480	-	-
Forage DM Weight	lb/ac	125	1600	1300
Costs/Acre				
Land Rent	$	8.76	14.22	14.22
Custom Work	$	-	5.31	5.31
Seed Cost	$	-	-	-
Baling Costs	$	-	8.58	6.97
Production Costs	$/ac	8.76	28.11	26.50
Forage DM Costs	$/ton	140.16	34.80	40.80
Crude Protein	%	9.2	6.4	14.5
Crude Protein Yield	lb/ac	11.50	102	189
Crude Protein Cost	$/lb	0.76	0.28	0.14
Forage Allocation	lb/d	30.0	27.0	18.8
Land Area/Period	ac	10.80	0.76	0.65
Forage Costs/Period	$/pp	94.64	21.38	17.10
Supplementation				
Roughage/Day	lb/d			8.2
Crude Protein/Day	lb/d		1.00	
Sup. Cost/Period	$/pp		13.50	6.43
Total Feed Cost	$/pp	94.64	34.91	23.53
Cost/Day	$/d	2.10	0.78	0.52
Accumulated Calf Wt.	lbs	81.00	85.50	85.50
Weight Value @$0.70/lb	$	56.70	59.85	59.85
Net Return/c-c pr	$	-37.94	24.94	36.32
Net Return/acre	$	-3.51	32.82	55.88
Cost/lb of Calf Gain	$	1.17	0.41	0.28

Table 29. Costs and returns for annual cereal harvested forage types to be fed to range cows during the 45-day early lactation production period.

		Forage Barley Hay	Forage Barley Hay	Oat Forage Hay	Oat Forage Hay
Days		45	45	45	45
Growth Stage		Milk	Hard Dough	Milk	Hard Dough
Herbage Weight	lb/ac				
Forage DM Weight	lb/ac	4733	5133	4667	5667
Costs/Acre					
Land Rent	$	22.07	22.07	22.07	22.07
Custom Work	$	16.08	16.08	16.08	16.08
Seed Cost	$	4.69	4.69	6.00	6.00
Baling Costs	$	25.37	27.51	25.02	30.38
Production Costs	$/ac	68.21	70.35	69.17	74.53
Forage DM Costs	$/ton	28.80	27.40	29.60	26.40
Crude Protein	%	13.0	9.2	11.5	7.8
Crude Protein Yield	lb/ac	606	468	535	435
Crude Protein Cost	$/lb	0.11	0.15	0.13	0.17
Forage Allocation	lb/d	21.0	27.0	23.7	27.0
Land Area/Period	ac	0.20	0.24	0.23	0.21
Forage Costs/Period	$/pp	13.50	16.65	15.75	16.04
Supplementation					
Roughage/Day	lb/d	6.0		3.3	
Crude Protein/Day	lb/d		0.25		0.62
Sup. Cost/Period	$/pp	4.73	3.38	2.60	8.37
Total Feed Cost	$/pp	18.23	20.03	18.35	24.41
Cost/Day	$/d	0.41	0.45	0.41	0.54
Accumulated Calf Wt.	lbs	85.50	85.50	85.50	85.50
Weight Value @$0.70/lb	$	59.85	59.85	59.85	59.85
Net Return/c-c pr	$	41.62	39.82	41.50	35.44
Net Return/acre	$	208.10	165.92	180.43	168.76
Cost/lb of Calf Gain	$	0.21	0.23	0.21	0.29

Table 30. Costs and returns for annual legume harvested forage types to be fed to range cows during the 45-day early lactation production period.

		Pea Forage Hay	Pea Forage Hay	Forage Lentil Hay	Forage Lentil Hay	Oat-Pea Hay
Days		45	45	45	45	45
Growth Stage		Early	Late	Early	Late	
Herbage Weight	lb/ac					
Forage DM Weight	lb/ac	2800	4650	1667	3867	5143
Costs/Acre						
Land Rent	$	22.07	22.07	22.07	22.07	22.07
Custom Work	$	16.08	16.08	16.08	16.08	16.08
Seed Cost	$	23.80	23.80	12.60	12.60	29.80
Baling Costs	$	15.01	24.92	8.94	20.73	27.57
Production Costs	$/ac	79.96	86.87	59.69	71.48	95.52
Forage DM Costs	$/ton	55.00	37.40	71.60	37.00	37.20
Crude Protein	%	18.9	14.4	21.8	14.7	12.5
Crude Protein Yield	lb/ac	526	685	361	567	611
Crude Protein Cost	$/lb	0.15	0.13	0.17	0.13	0.16
Forage Allocation	lb/d	14.4	19.0	12.5	18.6	21.8
Land Area/Period	ac	0.23	0.18	0.34	0.22	0.19
Forage Costs/Period	$/pp	18.45	15.75	20.70	15.75	18.45
Supplementation						
Roughage/Day	lb/d	12.6	8.0	14.5	8.4	5.2
Crude Protein/Day	lb/d					
Sup. Cost/Period	$/pp	9.92	6.30	11.42	6.62	4.10
Total Feed Cost	$/pp	28.37	22.05	32.12	22.37	22.55
Cost/Day	$/d	0.63	0.49	0.71	0.50	0.50
Accumulated Calf Wt.	lbs	85.50	85.50	85.50	85.50	85.50
Weight Value @$0.70/lb	$	59.85	59.85	59.85	59.85	59.85
Net Return/c-c pr	$	31.48	37.80	27.73	37.48	37.30
Net Return/acre	$	136.87	210.00	81.56	170.36	196.32
Cost/lb of Calf Gain	$	0.33	0.26	0.38	0.26	0.26

Table 31. Feed quantity and land area for forage types used during the 45-day early lactation production period.

Forage Types	Daily Feed per Cow			Early Lactation Period Feed one Cow for 45 days			
	Forage lb/d	Roughage lb/d	Crude Protein lb/d	Forage lb/pp	Roughage lb/pp	Crude Protein lb/pp	Land Area ac/pp
Pasture Forage Types							
Native Rangeland Repeated Seasonal	30.0			1350.0			10.80
Harvested Forage Types							
Crested Wheat, mature	27.0		1.00	1215.0		45.00	0.76
Crested Wheat, early	18.8	8.2		846.0	369.0		0.65
Forage Barley, early	21.0	6.0		945.0	270.0		0.20
Forage Barley, late	27.0		0.25	1215.0		11.25	0.24
Oat Forage, early	23.7	3.3		1066.5	148.5		0.23
Oat Forage, late	27.0		0.62	1215.0		27.9	0.21
Pea Forage, early	14.4	12.6		648.0	567.0		0.23
Pea Forage, late	19.0	8.0		855.0	360.0		0.18
Forage Lentil, early	12.5	14.5		562.5	652.5		0.34
Forage Lentil, late	18.6	8.4		837.0	378.0		0.22
Oat-Pea Forage	21.8	5.2		981.0	234.0		0.19

Table 32. Summary of feed costs for forage types used during the 45-day early lactation production period.

Forage Types	Forage Costs $/pp	Roughage Costs $/pp	Crude Protein Costs $/pp	Total Feed Costs $/pp	Daily Feed Costs $/d
Pasture Forage Types					
Native Rangeland Repeated Seasonal	94.64			94.64	2.10
Harvested Forage Types					
Crested Wheat, mature	21.38		13.50	34.91	0.78
Crested Wheat, early	17.10	6.43		23.53	0.52
Forage Barley, early	13.50	4.73		18.23	0.41
Forage Barley, late	16.65		3.38	20.03	0.45
Oat Forage, early	15.75	2.60		18.35	0.41
Oat Forage, late	16.04		8.37	24.41	0.54
Pea Forage, early	18.45	9.92		28.37	0.63
Pea Forage, late	15.75	6.30		22.05	0.49
Forage Lentil, early	20.70	11.42		32.12	0.71
Forage Lentil, late	15.75	6.62		22.37	0.50
Oat-Pea Forage	18.45	4.10		22.55	0.50

Table 33. Summary of returns after feed costs for forage types used during the 45-day early lactation production period.

Forage Types	Gross Return @$0.70/lb $/calf	Net Return per C-C pr $/pr	Net Return per acre $/ac	Calf Gain Cost $/lb
Pasture Forage Types				
Native Rangeland Repeated Seasonal	56.70	-37.94	-3.51	1.17
Harvested Forage Types				
Crested Wheat, mature	59.85	24.94	32.82	0.41
Crested Wheat, early	59.85	36.32	55.88	0.28
Forage Barley, early	59.85	41.62	208.10	0.21
Forage Barley, late	59.85	39.82	165.92	0.23
Oat Forage, early	59.85	41.50	180.43	0.21
Oat Forage, late	59.85	35.44	168.76	0.29
Pea Forage, early	59.85	31.48	136.87	0.33
Pea Forage, late	59.85	37.80	210.00	0.26
Forage Lentil, early	59.85	27.73	81.56	0.38
Forage Lentil, late	59.85	37.48	170.36	0.26
Oat-Pea Forage	59.85	37.30	196.32	0.26