

Advantages of Multispecies Grazing: Perceptions of Idaho and Wyoming Producers

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Summary

This study reports findings of a survey aimed at examining whether complementarity in sheep and cattle production is recognized by producers and is an important factor in the maintenance of both enterprises by ranchers in Idaho and Wyoming. Over 80% of respondents felt their cattle and sheep enterprises had some degree of integration and complemented one another. This complementarity was created by the dietary selection, grazing behavior and the social structure of sheep and cattle. While the sheep enterprise was the most labor intensive, labor and equipment requirements of the two enterprises were seen as being complementary. Profitability and cash flow additionally were aided by the diversification provided from maintaining both a sheep and cattle enterprise. The majority of producers felt that fluctuations in prices and production between sheep and cattle enterprises were somewhat offsetting. While 70% of respondents felt sheep had been historically more profitable than cattle, more respondents assigned a higher probability that they would abandon the sheep business before the cattle business because of recent trends in the industry.

Key Words: Survey, Multispecies grazing, Complementary products, Diversification.

Introduction

When grazing the same rangeland, sheep and cattle have been shown to exhibit complementary, supplementary and competitive relationships depending upon the stocking ratios of the two species and the type of rangeland involved. A competitive relationship implies that cattle and sheep will compete with each other for limited resources while a supplementary relationship exists when one species can be added to the grazing mix without decreasing the stocking rate of the other species. A complementary relationship evolves when adding one species to the grazing mix will result in also being able to increase the stocking rate of the original species. To demonstrate these relationships, assume a producer has 5,000 acres that can be grazed. Figure 1 contains a hypothetical production possibilities curve that shows different combinations of sheep and cattle that can graze on the 5,000 acres. If only sheep graze the forage, Figure 1 depicts that 1,000 ewes can be maintained. If only cattle graze the forage, Figure 1 assumes that 200 cows can be supported. A supplementary relationship exists when the range is stocked at the maximum to accommodate one species and the other species can be added to the range without decreasing the stocking rate of the original species (Supplementary Region). As numbers of the added species are in-

creased, the two species begin to compete for resources and the supplementary relationship evolves into a competitive relationship (Competitive Region). Under the competitive relationship, numbers of one species cannot be increased without decreasing numbers of the competing species. The curvature of the line in the competitive region also indicates diminishing returns. After a certain point, as more of one species is added, they displace more of the other species (i.e., competition for the resource gets more intense).

A complementary relationship is demonstrated in Figure 2 (Complementary Region). If the range is stocked at the maximum to accommodate one species and

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Figure 1. Hypothetical production possibilities frontier for cattle and sheep showing supplementary and competitive regions.

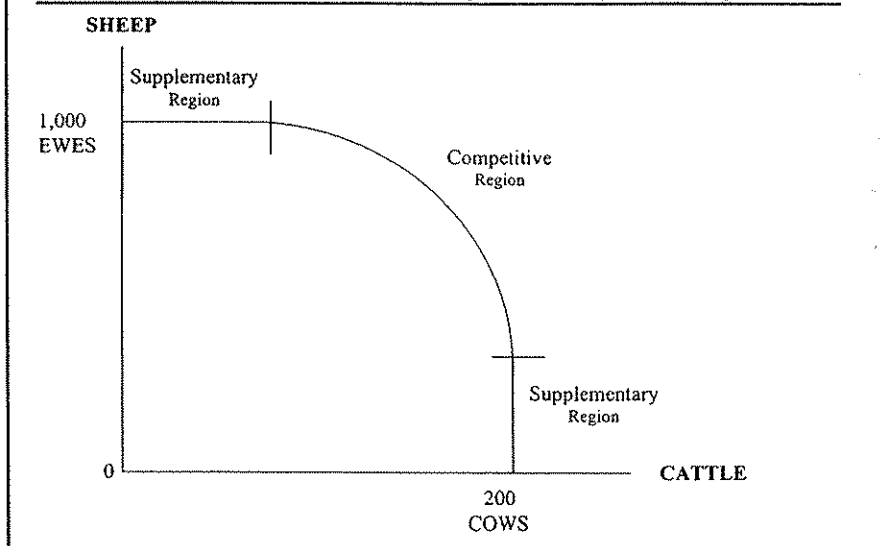
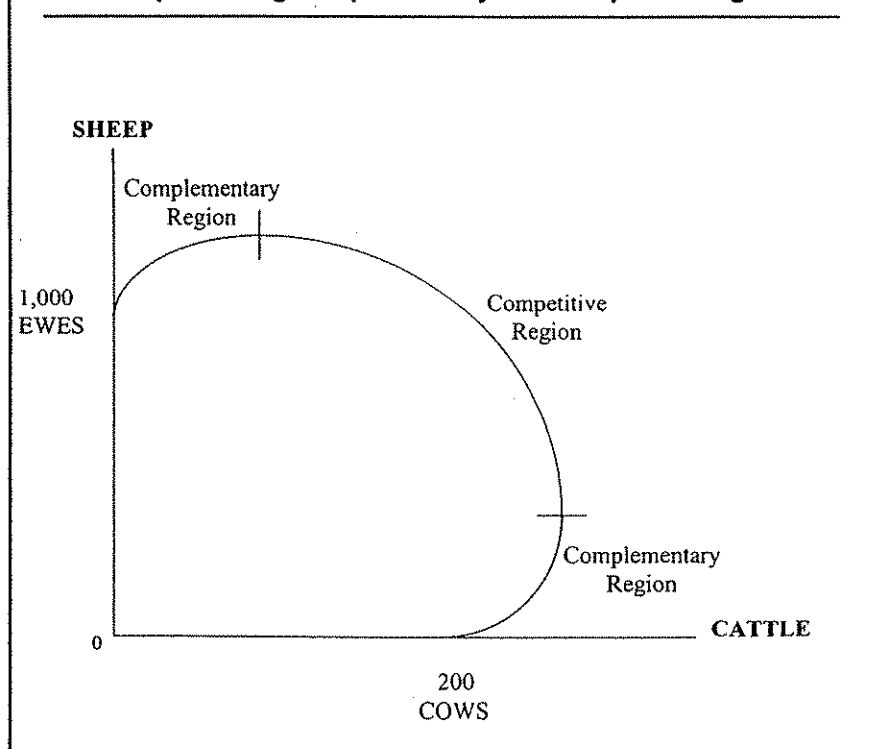


Figure 2. Hypothetical production possibilities frontier for cattle and sheep showing complementary and competitive regions.



another species is added to the range, the stocking rate (or production level) of the original species can be concurrently increased. This relationship will eventually evolve into a competitive relationship as additional numbers are added and the two species compete for scarce resources. These relationships typically

exist because cattle and sheep display different dietary selection, grazing behavior, and social structure (Jarman, 1974; Schwartz and Ellis, 1981; Hanley and Hanley, 1982). On many ranches, two to three sheep can be added per cow without decreasing cattle numbers (Hulet et al., 1992a). The scientific literature is full

of experimental studies where researchers have found complementary and supplementary relationships between cattle and sheep. For example:

- Van Dyne et al. (1980) summarized over 200 studies and concluded that sheep and cattle, respectively, consume 50 and 70% grass, 30 and 15% forbs, and 20 and 15% browse. Sheep and cattle overlap least in the spring (55%) and most in the summer and fall (75%) as grasses take dietary place of forbs for sheep due to defoliation of leaves (Walker, 1994).

- Topography is another consideration of livestock selectivity. Sheep can access forages on rough terrain, ridges, and steep slopes more easily than cattle (Rector, 1983).

- Increased efficiency from grazing different types of animals occurs when one species increases accessibility of high quality plant regrowth for consumption by a second species (Rector, 1983). Animal production and performance concurrently improves (Esmail, 1991).

- Sheep will consume weeds and forage near dung that cattle will not, thereby increasing total available feed (Abaye et al., 1993).

- The anatomical structure of the mouth allows sheep to graze closer to the soil surface and be more selective in their grazing preference than cattle (Walker, 1994).

- The production level of sheep, and at times cattle, has been shown to increase when social bonds have been developed between cattle and sheep, and they are grazed jointly (Hulet et al., 1992b; Abaye et al., 1993; Arnold, 1985; Esmail, 1991; Walker, 1994).

- Multispecies grazing may help control internal parasites, because stocking rate per species decreases thereby decreasing overall contamination. Cross-immunity between sheep and cattle also helps control gastrointestinal parasites. If one species ingests a host specific parasite of another species, it stimulates their own immune response to challenge their own parasite species (Esmail, 1991).

As shown in the literature, certain supplementary or complementary relationships are developed between cattle and sheep whether the two species simultaneously or alternately graze the same rangeland. Gee and Magleby (1976) found that two-thirds of sheep producers in the United States also raise cattle. They did not specify if the livestock species graze together or if any supplementary or complementary relationships were underlying reasons for simultaneously producing sheep and cattle.

This study was undertaken to examine the perceptions of sheep producers in Idaho and Wyoming regarding the complementarities of producing cattle and sheep on the same ranching operation to determine the major sources of the complementarities. The term complementary will be used in this study to describe both supplementary and complementary relationships.

Materials and Methods

A survey of Idaho and Wyoming sheep producers was conducted during the winter/spring of 2000. Wyoming currently ranks 2nd nationally in number of breeding sheep and 3rd in number of all sheep and 4th in the number of market sheep and lambs (NASS, 1999). Idaho ranks 8th nationally in number of breeding sheep, 8th in number of all sheep and 10th in the number of market sheep and lambs (NASS, 1999).

The survey instrument was used to obtain information regarding ranch size and resources, relative profitability of sheep and cattle enterprises, perceptions of producers, grazing management strategies, and complementarities of producing both sheep and cattle.

Surveys were mailed during February 2000. A reminder post card was sent two weeks later, followed by a second mailing of the survey four weeks after the original survey mailing. Budget constraints did not permit a telephone follow-up to determine producer bias.

Figure 3. Respondents' (sheep only and multispecies producers) estimation of the probability that they will still be in the sheep or cattle business in 10 years.

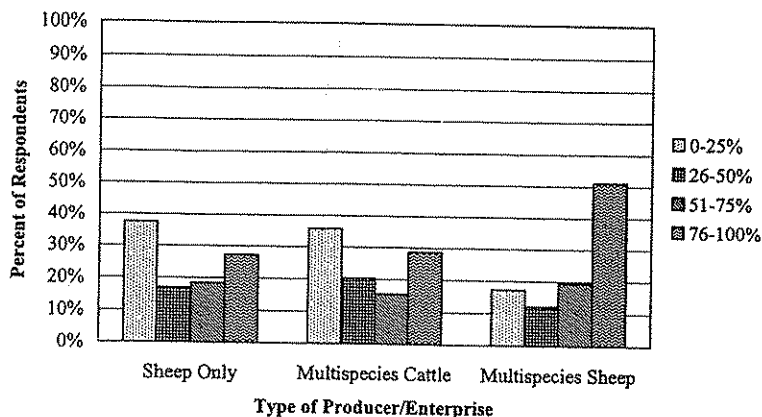
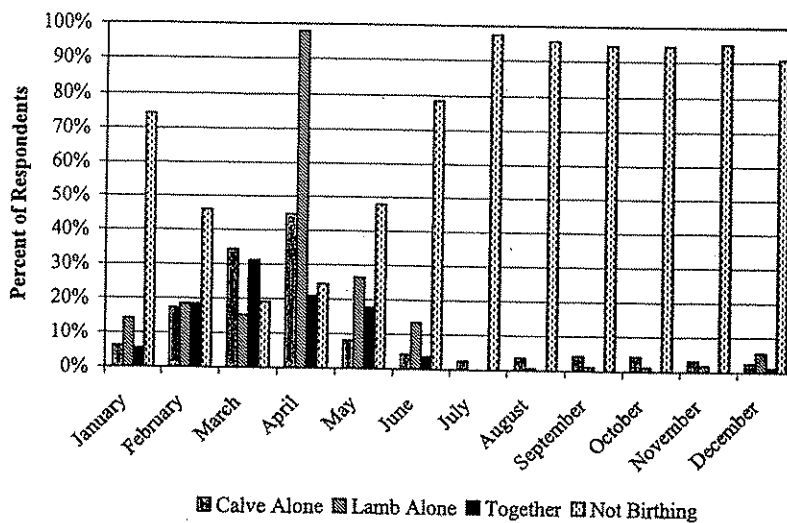


Figure 4. Respondents timing of lambing and calving by month.



Members of the Wyoming and Idaho Wool Growers Associations constituted the survey population. Each association provided names and addresses of member sheep producers. Most non-producers such as 4-H clubs, FFA clubs, and agricultural extension offices were deleted from the survey population.

Results and Discussion

Respondent and Resource Characteristics

Out of 815 individuals surveyed, 406 responded, for a 49.8% response rate. Of the 406 respondents, 69 were eliminated from the statistical analysis because they had retired and sold their operation, had received duplicate surveys, were feedlot operators, or no longer raised sheep. Of the remaining 337 completed surveys, 189 respondents produced sheep and cattle, and 142 produced sheep only. Twenty-nine percent of the sheep-only producers had previously owned cattle.

Table 1. Reasons producers gave for favoring cattle over sheep or sheep over cattle if they were required to liquidate one of the enterprises.^a

Reasons for Keeping Cattle	% Respondents	Reasons for Keeping Sheep	% Respondents
Fewer predator problems	85	Matches my management expertise	68
Better outlook for the industry	62	Personal preference	68
More available markets	57	Ease of handling	65
Easier to get labor	37	Our traditional operation	62
Ease of handling	31	Better cash flow	41
Better profitability	26	Better profitability	34
Better cash flow	24	Fewer environmental concerns	22
Matches my management expertise	23	More available markets	9
Our traditional operation	20	Better outlook for the industry	8
Fewer environmental concerns	14	Easier to get labor	8
Personal preference	11	Fewer predator problems	3

^aFifty-five percent of respondents stated that if they were required to liquidate one enterprise, they would liquidate the sheep enterprise. Forty-five percent stated they would liquidate their cattle enterprise.

Table 2. Respondents' perceptions regarding how well cattle and sheep enterprises complement one another.

Issue	Strongly		Neutral	Strongly	
	Agree	Agree		Disagree	Disagree
			%		
A. Cattle and sheep are run as separate operations and do not complement each other.	2	1	10	33	45
B. Cattle and sheep complement each other by the way they graze our terrain.	42	43	12	2	0
C. Cattle and sheep complement each other by their selection of grazed forages.	42	46	10	2	0
D. Sheep reduce noxious weeds on our operation.	29	51	15	5	14
E. Sheep grazing before or with cattle reduces poisonous plant toxicity in our cattle.	13	24	54	8	1
F. Sheep grazing with cattle reduces sheep predator losses.	7	24	31	23	14
G. Running both cattle and sheep helps diversify income because when prices are low for one, they are usually higher for the other.	34	45	17	4	0
H. Running both cattle and sheep helps diversify our income because when production is down for one enterprise, it is usually up for the other.	19	33	36	9	2
I. Running both cattle and sheep helps our cash flow, because we market their products at different times.	18	50	23	8	1
J. Running both saves on expenses, because equipment needs overlap.	16	55	19	8	2
K. Running both saves on expenses, because labor needs overlap.	14	54	24	7	1
L. Running both saves on expenses, because facility needs overlap.	13	46	27	11	3

Respondents indicated they have been producing livestock for an average of 40 years. Sheep only producers tended to

have smaller flocks (603 ewe average) compared to producers who ran both cattle and sheep (1,465 ewe average). The

average beef cattle inventory for multispecies producers (had both cattle and sheep) was 236 beef cows. Over 95%

of producers indicated they also maintained a yearling enterprise and/or a feeder lamb enterprise. For multispecies producers, cattle comprised an average of 52% of their AUM mix.

Much of the grazing occurred on non-irrigated pasture. Sheep only producers grazed an average of 8,010 acres of non-irrigated rangeland and 68 acres of irrigated forage while using 330 AUMs of crop aftermath. They also leased an average of 210 AUMs from their respective State Land Board. Multispecies producers were typically larger operations with an average of 20,491 acres of non-irrigated rangeland, 192 acres of irrigated forage and 376 AUMs of crop aftermath. State leases accounted for 477 AUMs of their forage.

Federal lands were important forage contributors to many of the operations. Fifty-one percent of the multispecies ranchers used Bureau of Land Management (BLM) lands for an average of 2,047 AUMs while 16% of sheep only producers maintained a BLM lease for an average of 1,982 AUMs. United States Forest Service (USFS) leases were operated by 31% of multispecies producers (1,033 AUM average) and by 15% of sheep only producers (846 AUM average).

Many producers raised hay (66% of respondents) and some small grains (36% of respondents). In addition, 19% of the producers stated they raised some other type of crop.

Profitability

When asked which was their most profitable enterprise on average, cattle or sheep, 70% of respondents stated sheep were more profitable. Some respondents wrote that cattle are presently more profitable, but that sheep were more profitable before the Wool Incentive Program ended and before predators became a major hindrance.

Respondents were asked to state the probability that they would still be in the sheep or cattle business 10 years from now. They were given categories of 0%

Figure 5. Total amount of time by month spent with the cattle, sheep and other enterprises.

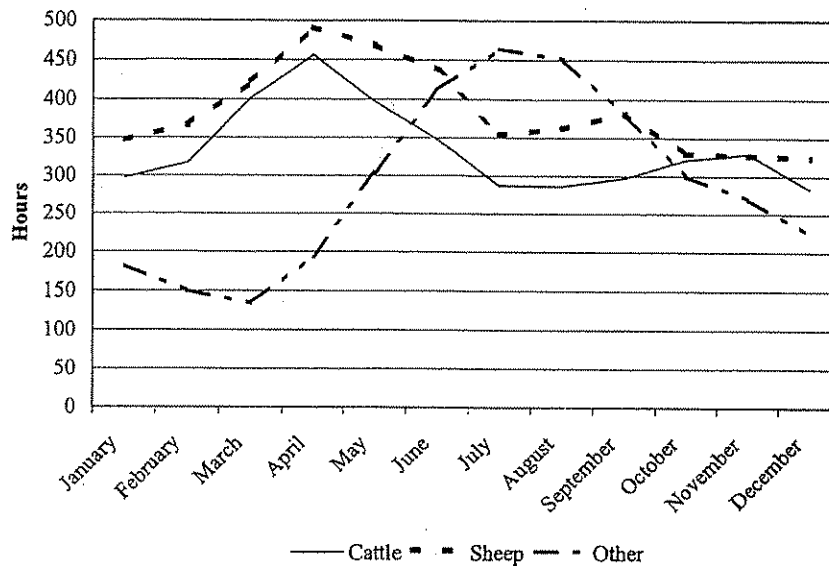
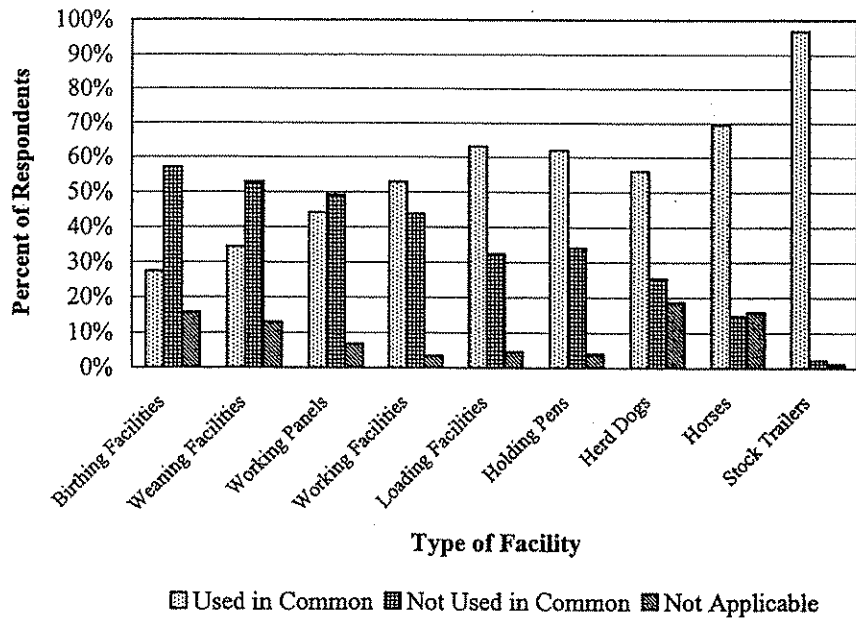


Figure 6. The percent of time facility and equipment are used in common by the cattle and sheep enterprises.



to 25%, 26% to 50%, 51% to 75% and 76% to 100% probability. Responses were quite similar with respect to sheep enterprises for both sheep only and multispecies producers (Figure 3). Nearly 40% of producers felt there was a low (0% to 25%) probability they would still be in the sheep business 10 years from

now. Just under 30 percent felt confident they would remain in business (75% to 100% probability). Conversely, over 50% of the multispecies producers assigned a 75% to 100% probability they would still be in the cattle business in 10 years and less than 20% gave a 0% to 25% probability of being in the cattle business.

Table 3. Respondents' average labor allocations per month by percentage of total hours.¹

Month	Cattle	Sheep	Other
		%	
January	36	42	22
February	38	44	18
March	42	44	14
April	40	43	17
May	34	40	26
June	29	37	34
July	26	32	42
August	26	33	41
September	28	36	36
October	34	35	31
November	36	35	29
December	34	39	27

¹Highest labor allocations per month are in bold.

Sheep producers, additionally, were asked to approximate their break-even lamb price at weaning. The average break-even lamb price at weaning was \$0.73/pound with a range of \$0.43/pound to \$0.97/pound. There was a slight difference in the break-even price between sheep only producers (\$0.74/pound) and multispecies producers (\$0.72/pound).

Producers appeared to have more economic reasons for raising cattle but had more sentimental reasons for raising sheep. Fifty-five percent of respondents stated they would choose cattle over sheep if required to liquidate one of their enterprises. The main reasons for choosing cattle were fewer predator problems, better industry outlook, and more available markets (Table 1). Additional comments offered by respondents as to why they would keep their cattle enterprise included: less theft; less labor, time, and management involved; no shearing involved; fewer BLM problems; and their federal grazing permits are only for cattle. The top four reasons given by producers who would choose to liquidate their cattle enterprise were: sheep production matched their management expertise; sheep were a personal preferences; sheep were easier to handle; and sheep production was their more traditional enterprise.

Additional reasons offered by producers for favoring sheep over cattle included: fewer health problems; less "outside" help needed; the ability of sheep to control weeds and brush; better use of range resources; sheep are better suited to their range/pasture; sheep are a "superior grass fed product"; their federal grazing permits are only for sheep and can not be changed; and "we are sheep people".

Multispecies Grazing

Respondents stated that 53% of their grazing land was used in common by cattle and sheep. The amount of grazing land used in common ranged from a low of 20% to a high of 100%.

The majority of respondents (63%) stated that sheep and cattle graze together at least part of the year. When grazing together, the cow-to-sheep ratio averaged 1:10. The cow-to-sheep ratios most frequently used by respondents were 1:5 (35% of respondents) and 1:10 (15% of respondents). Eleven percent of respondents stated their cow-to-sheep ratio was less than 1:1 (i.e., more than one cow per ewe).

Reasons offered by respondents regarding why they graze cattle and sheep to-

gether included: they utilize different forages; it is more economical to winter feed in the same area; they like each other; for convenience; limited land; predator control; and good range management. Reasons offered by respondents for not having their cattle and sheep graze together evolved around problems regarding non-bonding of the two species, lack of sheep fencing, and supplementation (copper) needed for the cattle was toxic to sheep.

Many of the respondents stated their sheep and cattle were grazed on the same land but at different times. When this occurred, 54% of respondents stated they had sheep graze first followed by cattle, while 46% stated they had cattle graze first. The main reason listed by producers for grazing sheep first was that sheep prefer or need young and short spring forage while cattle can cleanup older grasses. Other reasons included: sheep eat and trample noxious weeds before cattle are turned out; ewes are flushed on alfalfa aftermath before breeding; better livestock gains occurred when sheep have first pick; and "this best fits our resources". Reasons respondents offered for why they have cattle graze first were: sheep clean up what cattle will not eat; sheep will eat the forage down lower; cattle graze down tall, rank plants; reduces sheep bloat; fits their rotational

plan; sheep will graze creek bottoms after flies leave; sheep will utilize the browse; and "cattle need first choice of forage since sheep can survive on anything".

Complementarity Between Cattle and Sheep

To examine multispecies producers' perceptions regarding how well sheep and cattle enterprises complement one another, respondents were asked to state whether they strongly agreed (SA), agreed (A), were neutral (N), disagreed (D), or strongly disagreed (SD) with 12 statements regarding the complementarity of cattle and sheep (Table 2). Almost half (45%) of the survey respondents strongly disagreed and 33% disagreed that cattle and sheep were run as separate enterprises on their operation and did not complement each other. Respondents either agreed or strongly agreed that both species complement each other by the way they graze terrain (85%) and by their selection of forages grazed (88%). Eighty percent of respondents strongly agreed or agreed that sheep reduced noxious weeds, but the majority (54%) were indifferent as to whether sheep grazing reduced poisonous plant toxicity in their cattle. Respondents were likewise indifferent as to whether sheep grazing with cattle reduced sheep predator losses, with 31% of respondents on the agree side, 37% on the disagree side, and 31% being neutral.

Theoretically, one of the main reasons for diversifying enterprises is to reduce price and production risks. Price and production will ideally be reduced if income streams from the two enterprises move in opposite directions during a given time period (i.e., are negatively correlated). When asked how sheep and cattle enterprises aid in diversifying income, 79% of respondents agreed or strongly agreed that when prices are low for one enterprise, they are usually high for the other. The majority of respondents (53%) likewise agreed that fluctuations in production between sheep and cattle enterprises were generally offsetting. With respect to cash flow considerations, 71% of re-

spondents felt that the ability to market sheep and cattle products at different times of the year aided their cash flow situation. In most cases, respondents also agreed or strongly agreed their operating expenses were reduced because equipment needs, labor requirements, and facility needs of their cattle and sheep enterprises overlapped.

Several respondents added additional reasons why they maintain both sheep and cattle enterprises. These reasons dealt with issues such as banks would only lend money for cattle expansion, sheep better utilize winter pastures because they can effectively use snow as a water source, cattle can graze the remote parts of the ranch without hindrance from predators and greater carrying capacity of the land is obtained from using both enterprises equaled increased income.

To more thoroughly examine the complementarity of cattle and sheep enterprises with respect to labor, respondents were asked to state the months in which they lamb and calved. Producers were additionally asked to indicate the number of hours of labor that were available each month on the ranch and how those hours were allocated between sheep, cattle and other enterprises. As may be expected in the western U.S., most of the lambing and calving occurred in early spring (Figure 4). By far, April appeared to be the most opportune time for lambing or calving. Over 66% of respondents were lambing and/or calving three or more months out of the year.

Forty-five percent of respondents planned their lambing and calving so they did not overlap while 12% did all of their lambing and calving concurrently. Approximately 27% of respondents overlapped their lambing and calving by 1 month and 24% concurrently lamb and calved over a 2-month period. Concurrent lambing and calving occurred most frequently in March.

When total labor requirements were examined, more labor was expended on the sheep enterprise than cattle in all months

except November (Figure 5 and Table 3). Sheep accounted for 32% to 44% of the monthly labor requirements of the whole ranch. Calving and lambing season required the greatest amount of labor followed by farming during the summer months. Other activities (e.g., farming) used the highest percentage the labor available in July and August.

The facilities required for beef and sheep production may or may not always be complementary between the two enterprises. Respondents were given a listing of assets that are typically found on cattle and sheep operations and were asked to state if they were used in common, not used in common, or were not applicable to their ranching operations. Approximately 50% to 60% of respondents used the same working facilities, loading facilities, holding pens, and herd dogs for both their sheep and cattle enterprises. Stock trailers were used most in common (97% of respondents) along with horses (70% of respondents). Separate birthing and weaning facilities were maintained for sheep and cattle by 57% and 53% of respondents, respectively.

Conclusions

Complementarity was found to play an important role in the maintenance of multispecies cattle and sheep operations in Idaho and Wyoming. Better utilization of forages appears to be a major reason why producers maintain both enterprises. While maintaining two separate livestock enterprises frequently requires additional investment in facilities and equipment, this overlap apparently is kept at a minimum with most producers. Sheep and cattle labor requirements additionally were considered to be complementary.

While minimal economic analysis has been conducted to determine the economic advantages of integrating a sheep and cattle enterprise, respondents perceived an economic advantage from diversification. Most producers felt cattle and sheep outputs and prices ran counter enough to diversify income and even out cash flows.

Despite the complementarity found between cattle and sheep enterprises, a continued reduction in sheep numbers is expected as nearly 40% of respondents stated there was a high probability (75% to 100%) they would not be in the sheep business 10 years from now. A better industry outlook, more available markets, fewer predator problems and less labor concerns were the major reasons producers picture a brighter future for the cattle industry.

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