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Vertical Coordination in the Cow/Calf-Feedlot Segment of the Beef Subsector

by

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Working paper prepared for the Beef Subsector Task Force of NC-117
March 11-12, 1976

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Introduction

The beef subsector of the U.S. food sector is many-faceted, consisting of several stages in the production-transformation process necessary to provide consumers with beef products at retail. These various stages interact and are interconnected--sometimes tightly so by being performed in a single, vertically integrated firm and sometimes only loosely interconnected through various market and exchange systems. Clearly, the type of mechanisms and systems used to interconnect and coordinate activities at different stages in the subsector is at least partially a function of the structure and characteristics of the subsector and individual stages therein. Likewise, the economic performance of the subsector, in terms of things like efficiency, flexibility, progressiveness, equity and the accuracy with which it allocates resources to satisfy ultimate demand, is at least partially a function of the systems and activities used for interstage coordination.

This paper addresses the questions of interstage coordination between the cow/calf and the feedlot stages of the beef subsector. While a third stage, growing, is evidenced in some cases between these stages, it appears to function more as a means for facilitating coordination between cow/calf and feedlot operations than as a distinct production stage with unique characteristics. Frequently, the so-called growing activity is performed as part of either the cow/calf or feedlot

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enterprise. As such, that activity is considered, for the purposes of this paper, to be primarily a coordinating activity when it is performed outside of the cow/calf or feedlot stages and part of either the cow/calf or feedlot stages when performed therein. It is not treated as a separate or unique stage, per se.

The purpose of this paper is not to evaluate performance; rather to highlight the unique structural and other characteristics of these two stages that appear to be determinants of the kinds of interconnecting systems and mechanisms that are used to coordinate activities between these stages. Additionally, insights into the relative strengths and weaknesses of these alternative methods of achieving vertical coordination are drawn from the existing literature. As a result, many unanswered questions about performance become apparent.

Structure and Characteristics

Some of the most important characteristics of the cow/calf and feedlot stages of the beef subsector, in terms of their impact on interstage coordination, are those for which there are actual, perceived or potential differences between the two stages that are of significant magnitude to create extraordinary coordination difficulties. These appear to fall into four general categories: spatial characteristics, size of enterprises, seasonality, and product characteristics.

Spatial Characteristics

Beef cow herds and the production of feeder calves are widely dispersed geographically in the U.S. while feedlot operations are much more heavily concentrated in the mid-continental area. Only one state, Texas, accounts for as much as 10 percent of the total beef cow herd. The next largest states in terms of beef brood cows are Oklahoma and Missouri, each with about 6 percent of the nation's total. These are followed by 11 states that each account for between

2.5 and 5 percent of the total and another 14 states that each account for 1-2.5 percent (see Table 1 and Figure 1). Thus, while there is some tendency toward the geographical concentration of feeder cattle production in the Texas-Oklahoma-Missouri area, this is not a high level of spatial concentration (27%) and, in fact, such production is found in reasonably significant quantity in at least 28 states.

Additionally, geographical dispersion of feeder calf production occurs within states as well as among states. Typically, beef cow herds tend to be most heavily concentrated in relatively hilly areas where pastureland is plentiful and grain crop cultivation is difficult. However, limited evidence again suggests that this does not result in a extremely high degree of spatial concentration within states. Generally, land less suited for grain production is rather widely dispersed in most states, thus the dispersion of cow/calf enterprises. In Ohio, for example, about 30 percent of the land area is in the generally hilly Appalachian area. And about 40 percent of the beef brood cows are found in that area. Yet, the remaining 60 percent are distributed more-or-less evenly over the balance of the state.

Feedlot operations, on the other hand, are much more heavily concentrated, geographically. Almost half of the cattle on feed in feedlots are concentrated in just four states: Texas, Iowa, Nebraska and Kansas. Adding the next 3 largest states, California, Colorado and Illinois, brings the total to over two-thirds (Table 2 and Figure 2). Whereas, the four largest states in terms of beef cow numbers account for less than one-third of the total and the largest seven, less than 45 percent. Furthermore, whereas cow/calf enterprises are rather widely dispersed within states, feedlot operations appear to be concentrated more heavily in smaller geographic areas; witness the Texas panhandle.

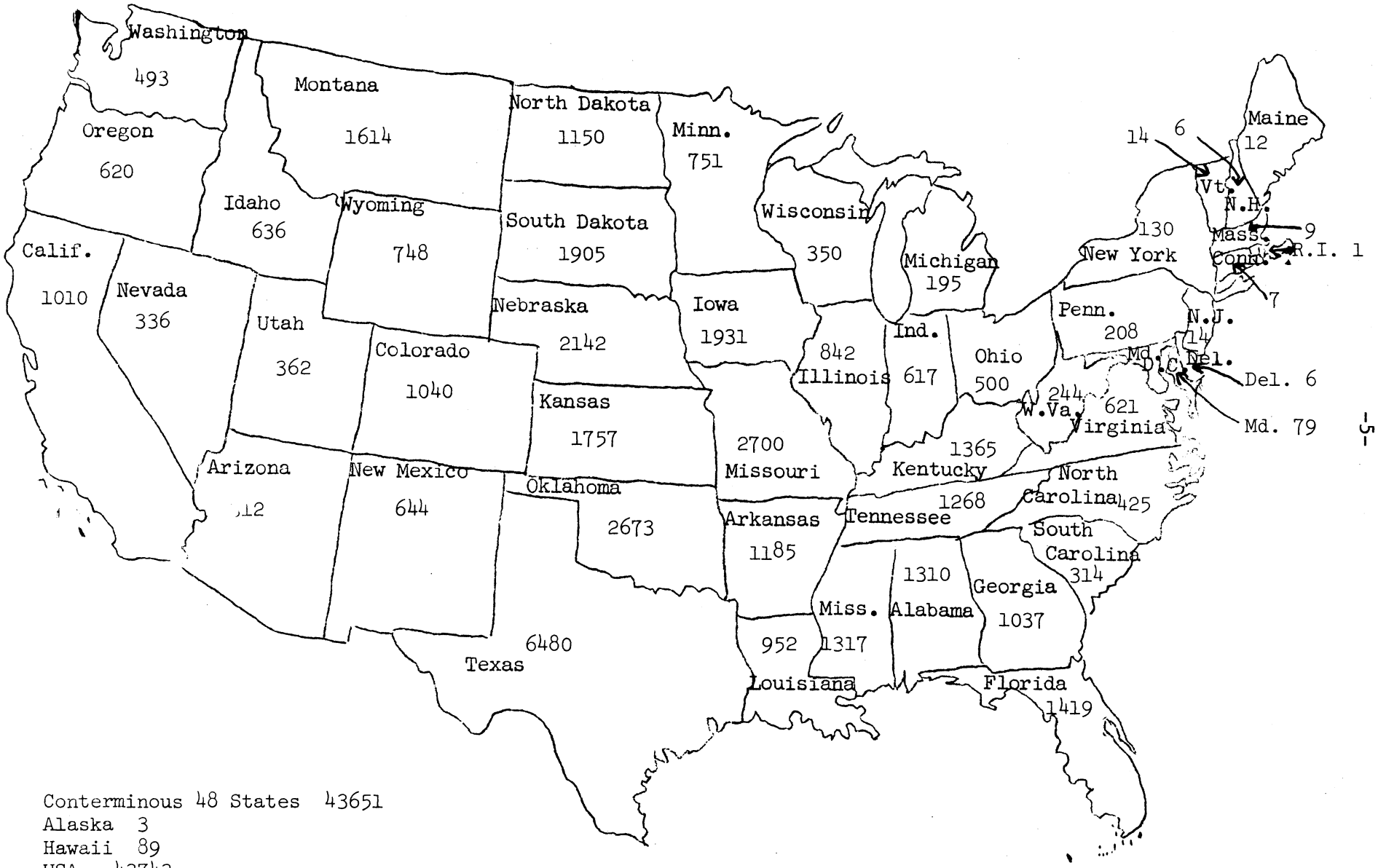
Table 1. Distribution of Beef Cows[1/] by States
January 1, 1976

State	Number of Head (000)	Percent of Total	State	Number of Head (000)	Percent of Total
North Atlantic	401	0.9	South Central	16550	37.9
Maine	12	ND	Kentucky	1365	3.2
New Hampshire	6	ND	Tennessee	1268	2.9
Vermont	14	ND	Alabama	1310	3.0
Massachusetts	9	ND	Mississippi	1317	3.0
Rhode Island	1	ND	Arkansas	1185	2.7
Connecticut	7	ND	Louisiana	952	2.2
New York	130	0.3	Oklahoma	2673	6.1
New Jersey	14	ND	Texas	6480	14.8
Pennslyvania	208	0.5	Western	7715	17.6
East North Central	2504	5.7	Montana	1614	3.7
Ohio	500	1.2	Idaho	636	1.5
Indiana	617	1.4	Wyoming	748	1.7
Illinois	842	1.9	Colorado	1040	2.4
Michigan	195	0.4	New Mexico	644	1.5
Wisconsin	350	0.8	Arizona	312	0.7
West North Central	12336	28.2	Utah	362	0.8
Minnesota	751	1.7	Nevada	336	0.7
Iowa	1931	4.4	Washington	393	0.9
Missouri	2700	6.2	Oregon	620	1.4
North Dakota	1150	2.6	California	1010	2.3
South Dakota	1905	4.4			
Nebraska	2142	4.9	Alaska	3	ND
Kansas	1757	4.0	Hawaii	89	.2
South Atlantic	4145	9.5	USA	43743	100.0
Delaware	6	ND			
Maryland	79	.2			
Virginia	621	1.4			
West Virginia	244	.6			
North Carolina	425	1.0			
South Carolina	314	.7			
Georgia	1037	2.4			
Florida	1419	3.2			

1/ Beef Cows that have calved

Source: "Cattle" USDA Statistical Reporting Service Crop Reporting Board
LVGNI (2,76) Feb. 2, 1976, Washington, D.C.

Figure 1. Beef Cows (000) Head [1/]
That Have Calved - January 1, 1976



Conterminous 48 States 43651
Alaska 3
Hawaii 89
USA 43743

[1/] "Cattle" SRS-USDA LVGN 2-76 Feb. 2, 1976

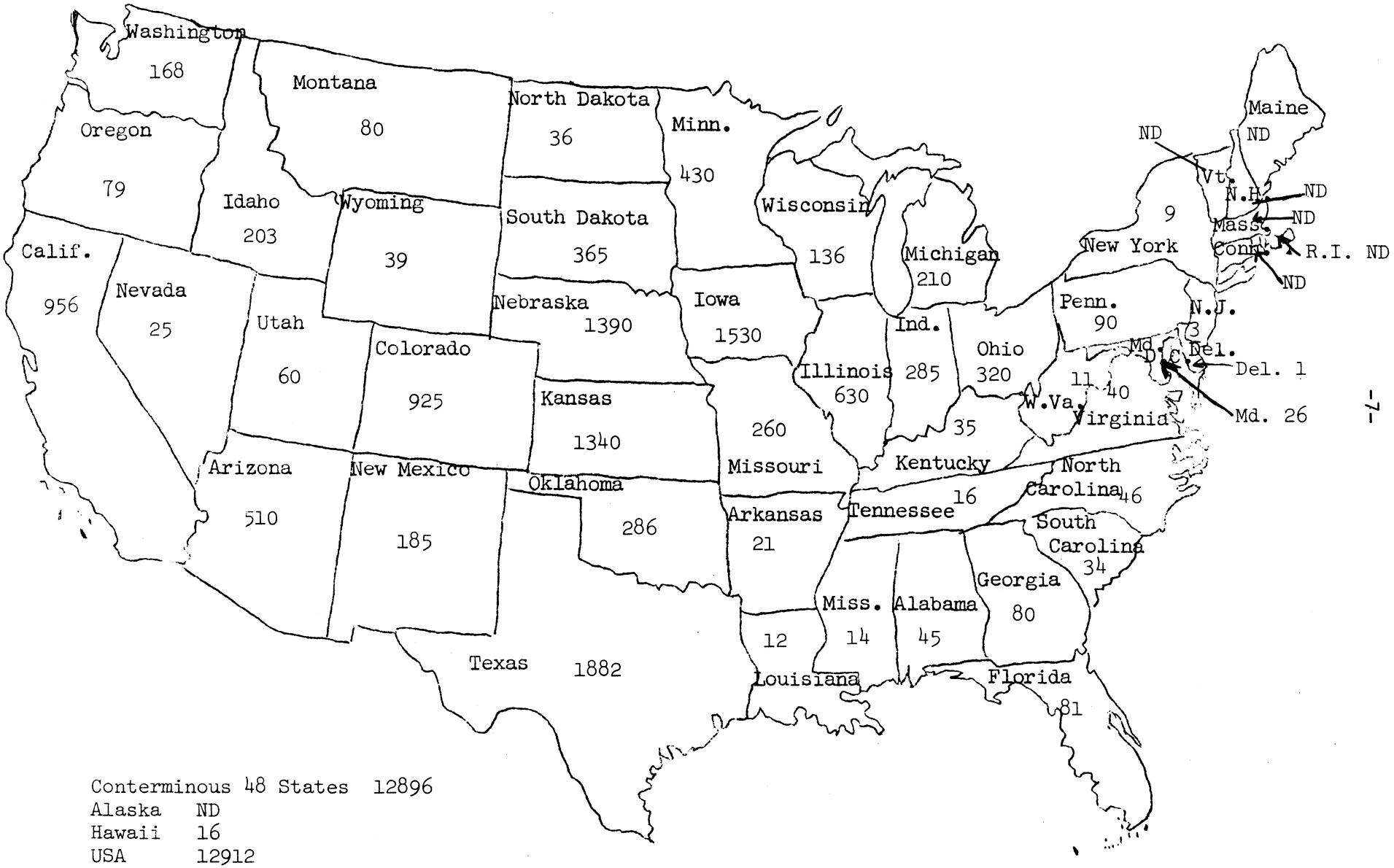
Table 2. Distribution of Cattle Feeding:
Cattle on Feed January 1, 1976

State	Number of Head (000)	Percent of Total	State	Number of Head (000)	Percent of Total
North Atlantic	104[1/]	0.8	South Central	2311	17.9
Maine	ND	ND	Kentucky	35	0.3
New Hampshire	ND	ND	Tennessee	16	0.1
Vermont	ND	ND	Alabama	45	0.3
Massachusetts	ND	ND	Mississippi	14	0.1
Rhode Island	ND	ND	Arkansas	21	0.2
Connecticut	ND	ND	Louisiana	12	0.1
New York	9	-	Oklahoma	286	2.2
New Jersey	3	-	Texas	1882	14.6
Pennsylvania	90	0.7	Western	3230	25.0
East North Central	1581	12.3	Montana	80	0.6
Ohio	320	2.5	Idaho	203	1.6
Indiana	285	2.2	Wyoming	39	0.3
Illinois	630	4.9	Colorado	925	7.2
Michigan	210	1.6	New Mexico	185	1.4
Wisconsin	136	1.1	Arizona	510	3.9
West North Central	5351	41.4	Utah	60	0.5
Minnesota	430	3.3	Nevada	25	0.2
Iowa	1530	11.8	Washington	168	1.3
Missouri	260	2.0	Oregon	79	0.6
North Dakota	36	0.3	California	956	7.4
South Dakota	365	2.8			
Nebraska	1390	10.8	Alaska	ND	ND
Kansas	1340	10.4	Hawaii	16	0.1
South Atlantic	319	2.5	USA	12912	100.0
Delaware	1	-			
Maryland	26	0.2			
Virginia	40	0.3			
West Virginia	11	0.1			
North Carolina	46	0.4			
South Carolina	34	0.3			
Georgia	80	0.6			
Florida	81	0.6			

1/ Estimated

Source: "Cattle" USDA Statistical Reporting Service Crop Reporting Board
LVGN (2, 76) February 2, 1976, Washington, D.C.

Figure 2. Distribution of Cattle Feeding: [1/]
Cattle on Feed January 1, 1976



Conterminous 48 States 12896
Alaska ND
Hawaii 16
USA 12912

[1/] "Cattle" USDA Statistical Reporting Service Crop Reporting Board
LVGN (2, 76) February 2, 1976, Washington, D.C.

When the beef calf crop is adjusted to account for the number of calves used for replacement of breeding stock and for the slaughter of non-fed steers and heifers, a comparison with the number of fed cattle marketed per state gives some insight into the implications of the disparate spatial characteristics of these adjacent stages. On this basis, twelve of the 41 states with measurable cattle operations 1/ have a net deficit of feeder cattle while the remaining 29 produce a surplus of calves relative to the number cattle fed. (Table 3 and Figure 3). Of the 12 states with deficits, five have deficits exceeding 1 million head and the average shortfall exceeds 650,000 head. Among the surplus states, however, only one has a surplus exceeding 1 million head and the average is less than 450,000 head.

The implications of such a spatial configuration are clearly centered on the magnitude of the transportation requirements for feeder cattle. Obviously, a substantial costly and complex flow of cattle around the country occurs. Additionally, the purchasing function is more complex when buyers must procure feeders from widely dispersed geographic areas. Spatial differences between buyers and sellers create special demands upon the marketing system in terms of communications and coordination. Clearly, these are more difficult to facilitate under such spatially dispersed conditions.

To the extent that effective communications and coordination is not achieved, it is not inconceivable that the market system functions to further isolate feedlot operators from feeder cattle producers. That is, if effective coordination, or that which results in a close alignment between the input requirements of

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1/ Excluded are Maine, New Hampshire, Vermont, Maryland, Rhode Island, Connecticut, Delaware, Hawaii and Alaska.

Table 3. Feeder Cattle
Supply/Demand Balance 1975

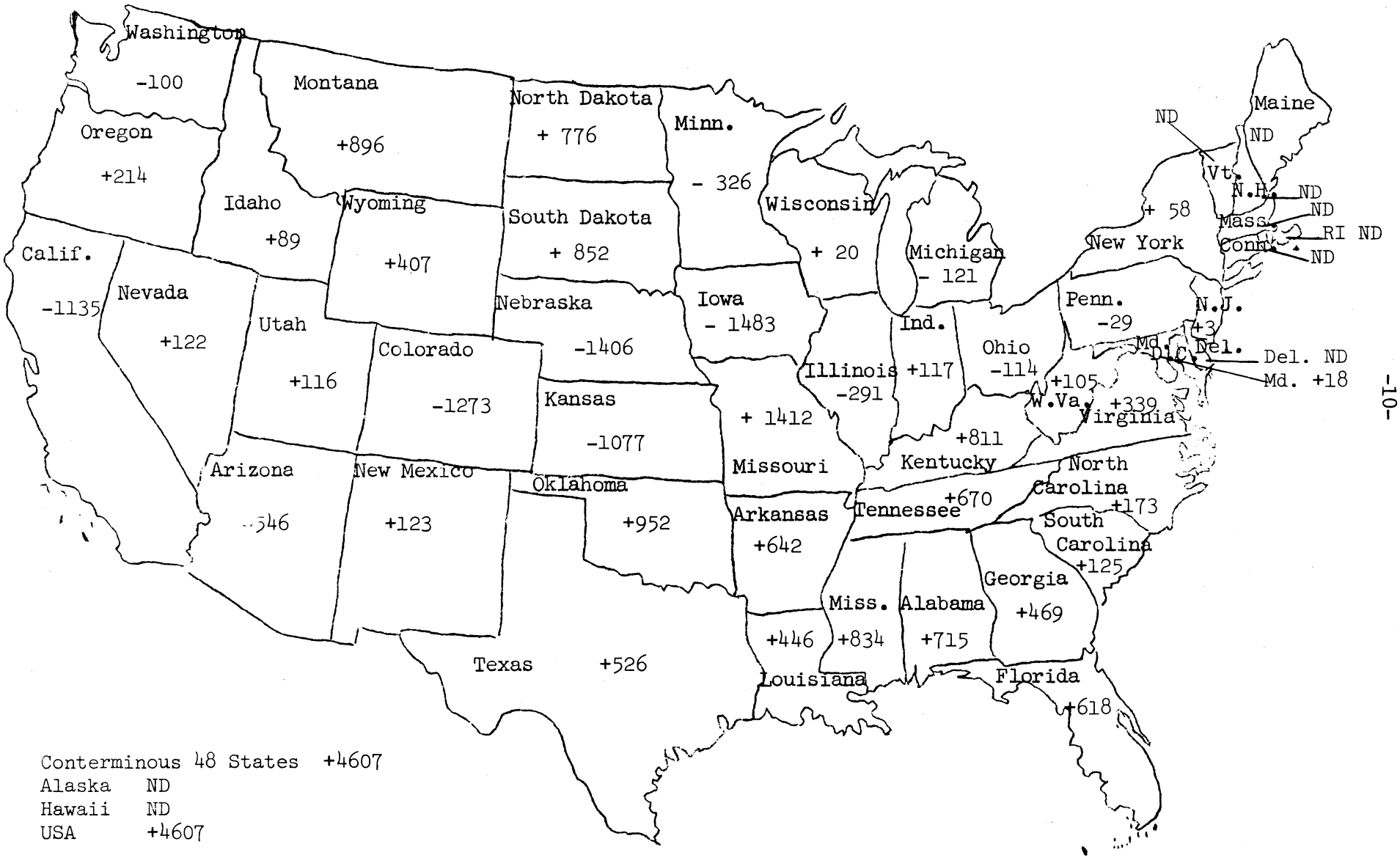
State	Number of Fed Cattle Marketed[1] (000)	Beef Calf Crop[2/3] (000)	Replacements[4] (000)	Non-Fed Steers and Heifers[5] (000)	Excess Feeder Cattle Supply (000)
North Atlantic	122	302	97	205	+ 32
Maine	ND	ND	ND	ND	ND
New Hampshire	ND	ND	ND	ND	ND
Vermont	ND	ND	ND	ND	ND
Massachusetts	ND	ND	ND	ND	ND
Rhode Island	ND	ND	ND	ND	ND
Connecticut	ND	ND	ND	ND	ND
New York	3	120	38	82	+ 58
New Jersey	2	13	6	7	+ 3
Pennsylvania	117	169	53	116	- 29
East North Central	1960	2379	460	1919	- 489
Ohio	379	451	101	350	- 114
Indiana	346	575	96	479	+ 17
Illinois	805	818	139	679	- 291
Michigan	244	196	33	163	- 121
Wisconsin	186	339	91	248	+ 20
West North Central	9432	12445	1676	10779	-1252
Minnesota	760	726	152	574	- 326
Iowa	2645	1761	225	1536	-1483
Missouri	338	2733	421	2312	+1412
North Dakota	67	1227	140	1087	+ 776
South Dakota	561	2092	225	1867	+ 852
Nebraska	2795	2110	275	1835	-1406
Kansas	2264	1806	238	1568	-1077
South Atlantic	279	3608	799	2809	+1722
Delaware	ND	ND	ND	ND	ND
Maryland	12	65	25	40	+ 18
Virginia	20	589	114	475	+ 339
West Virginia	12	215	61	154	+ 105
North Carolina	40	377	96	281	+ 173
South Carolina	20	257	65	192	+ 125
Georgia	90	918	180	738	+ 469
Florida	85	1187	258	929	+ 618

Table 3

State	Number of Fed Cattle Marketed[1] (000)	Beef Calf Crop[2][3] (000)	Replacements[4] (000)	Non-Fed Steers and Heifers[5] (000)	Excess Feeder Cattle Supply (000)
South Central	3786	15066	2670	12397	+5596
Kentucky	38	1350	228	1122	+ 811
Tennessee	26	1177	257	920	+ 670
Alabama	50	1210	199	1011	+ 715
Mississippi	26	1288	152	1137	+ 834
Arkansas	38	1120	222	898	+ 642
Louisiana	26	776	152	624	+ 446
Oklahoma	515	2338	400	1938	+ 952
Texas	3067	5807	1060	4747	+ 526
Western	5598	7344	1385	5959	-1087
Montana	132	1632	274	1358	+ 896
Idaho	330	655	101	554	+ 89
Wyoming	55	748	138	610	+ 407
Colorado	1838	927	180	747	-1273
New Mexico	261	613	106	507	+ 123
Arizona	729	287	45	242	- 546
Utah	76	319	65	254	+ 116
Nevada	66	298	50	248	+ 122
Washington	313	373	92	281	- 100
Oregon	149	573	94	479	+ 214
California	1649	919	240	679	-1135
Alaska	ND	3	ND	ND	ND
Hawaii	3	67	ND	ND	ND
USA	21180	41271	7197	34074	+4607

1/ Extrapolated from USDA Cattle on Feed Reports
2/ Western Livestock Market Information Project
3/ Not adjusted for death loss
4/ SRSUSDA Crop Report Board "Cattle" February, 1976
5/ Nonfed steer and heifer slaughter, Packers and Stockyard Resume

Figure 3. Feeder Cattle [1/]
Supply/Demand Balance 1975



Conterminous 48 States +4607
Alaska ND
Hawaii ND
USA +4607

[1/] Source: Derived (see table 3)

the feedlot and the output of the cow-calf enterprises, is difficult to achieve because of spatial disparity, perhaps the marketing system functions more to facilitate product flow than communication and coordination. Hypothetically, at least, the market system may function in a way that thwarts or camouflages effective communications in order to facilitate product movement.

The demands upon the coordination system to facilitate transportation in an efficient manner and with a minimum stress on cattle are obvious, and require no elaboration here.

Size of Enterprise

Just as there is a pronounced disparity in the spatial location of the adjacent feedlot and cow/calf stages of the beef sector, there is also a significant disparity in the size distribution of enterprises in these two stages. In general, cow/calf enterprises tend to be small; feedlot enterprises tend to be larger.

The relatively large number of small producers that dominate the cow/calf industry is clear (Table 4). East of the high plains states, over half of the cow-calf enterprises have fewer than 20 head of beef brood cows,and these small operations account for about one-third of all beef cows in this area. The dominance of the small herd is only moderately less pronounced in the western states, although the larger cow/calf enterprises account for a significantly larger share of the total herd than in the east. Clearly, because of both the small average herd size and the relatively large numbers of cows in small herds, a large share of the feeder calves are being sold by relatively small operators. The 1969 census data indicates, for example, that about 75 percent of all feeder cattle producers market fewer than 50 head per year.

Table 4. Distribution of Beef Cow Herds and Beef Cows By Size of Farm, 1969

State	Percentage of the Cow Herds in Each Size Group By Size			Percentage of Cows in Each Size Group By Size		
	<20	20-49	>50	<20	20-49	>50
North Atlantic						
Maine	84	12	4	44	27	29
New Hampshire	80	15	5	35	32	33
Vermont	75	18	7	34	33	33
Massachusetts	86	11	3	40	20	40
Rhode Island	66	22	12	26	31	43
Connecticut	79	14	7	32	28	40
New York	75	20	5	33	37	31
New Jersey	71	20	9	24	30	46
Pennsylvania	75	21	4	37	40	23
East North Central						
Ohio	73	22	5	37	39	24
Indiana	70	25	5	35	39	26
Illinois	63	30	7	28	41	31
Michigan[1/]	72	23	6	29	37	34
Wisconsin	72	22	6	32	40	29
West North Central						
Minnesota	62	29	9	25	41	34
Iowa	46	41	13	17	44	39
Missouri	42	42	16	15	42	43
North Dakota	32	38	30	7	28	65
South Dakota	25	36	39	5	20	75
Nebraska[1/]	35	40	25	10	25	65
Kansas[1/]	36	43	21	12	39	50
South Atlantic						
Delaware	79	15	6	30	32	38
Maryland	69	23	8	25	34	41
Virginia	53	33	14	17	34	49
West Virginia	46	41	13	17	44	39
North Carolina	76	19	5	33	35	32
South Carolina	56	29	16	14	29	57
Georgia	52	31	17	15	30	55
Florida	34	28	38	3	7	90
South Central						
Kentucky	58	32	10	23	40	37
Tennessee	55	34	11	21	41	38
Alabama	47	32	21	11	24	65
Mississippi	37	37	26	8	26	66
Arkansas	41	39	20	11	33	56
Louisiana	40	30	30	7	18	75
Oklahoma	30	43	27	7	29	64
Texas	32	37	31	6	19	75

State	Percentage of the Cow Herds in Each Size Group By Size			Percentage of Cows in Each Size Group By Size		
	<20	20-49	>50	<20	20-49	>50
Western						
Montana 1/	8	8	84	1	1	98
Idaho	39	29	33	5	15	80
Wyoming	16	24	60	1	6	93
Colorado	26	30	44	3	13	84
New Mexico	22	28	50	6	8	86
Arizona	20	18	62	1	4	95
Utah	31	31	38	4	15	81
Nevada	14	19	67	1	2	97
Washington	50	28	22	9	21	70
Oregon	44	26	30	5	11	84
California	39	22	39	3	8	89
Alaska	ND	ND	ND	ND	ND	ND
Hawaii	40	20	40	1	2	97

1/ Estimated

Source: 1969 US Census of Agriculture Table 17, "Cows Other Than Milk Cows"

Feedlot operators, on the other hand, are typically much larger (Table 5). While data indicate that there are substantially more small feedlots than large, the large lots (1000 head or more) market almost twice as many fed cattle as do the smaller lots (less than 1000 head), in total. Overall, almost two-thirds of all fed cattle marketings come from the big lots. This suggests, in turn, that the large lots acquire about the same proportion of all feeder cattle sold. Additionally, the so-called small lots are still relatively large compared to most cow/calf enterprises. The typical small lot of up to 1000 head is easily several times as large as the typical cow/calf enterprise. Thus, the typical feeder cattle producer is selling 50 head or fewer while the typical feedlot operator is purchasing 1000 head and more. This is a significant size disparity.

This disparity in size of operations between these two adjacent stages creates a couple of difficulties in marketing and interstage coordination. The small lots of cattle typically available from individual producers aren't large enough to satisfy the feedlot operator's needs. Thus, buyers must procure supplies from several sources to not only fill the feedlot requirements, but frequently to have a large enough truckload for efficient transportation. As a result, feedlot operators find the task of seeking-out supplies from small, widely dispersed producers to be arduous and costly. Probably, in many cases, little effort is extended by feedlot operators to communicate carefully their needs to such a large and disperse group of producers. The task of communication and coordination tends to fall, rather imperfectly, on price and market agents such as dealers and order buyers and perhaps, to a lesser extent, on specialized growing operations.

Additionally, the necessity of physical assembly for transportation efficiencies results in extra handling of feeder cattle, places an obvious demand

Table 5. Fed Cattle Marketed by Feedlot Size 1975

State	Number of Lots by Capacity			Fed Cattle Marketed		
	1000 Head and Less	Over 1000 Head	Total	Lots Under 1000 Head Capacity	Lots Over 1000 Head Capacity	Total
				(Thousand Head)		
North Atlantic						122
Maine	ND	ND	ND	ND	ND	ND
New Hampshire	ND	ND	ND	ND	ND	ND
Vermont	ND	ND	ND	ND	ND	ND
Massachusetts	ND	ND	ND	ND	ND	ND
Rhode Island	ND	ND	ND	ND	ND	ND
Connecticut	ND	ND	ND	ND	ND	ND
New York	ND	ND	ND	ND	ND	3
New Jersey	ND	ND	ND	ND	ND	2
Pennsylvania	5997	3	6000	113	4	117
East North Central						1960
Ohio	8175	25	8200	322	57	379
Indiana	10975	25	11000	316	30	346
Illinois	14450	50	14500	720	85	805
Michigan	1667	33	1700	183	61	244
Wisconsin	7069	31	7100	155	31	186
West North Central						9432
Minnesota	10531	49	10580	698	64	762
Iowa	32841	159	33000	2334	311	2645
Missouri	10965	35	11000	300	38	338
North Dakota	882	18	900	27	40	67
South Dakota	9132	68	9200	363	198	561
Nebraska	14700	374	15074	1130	1665	2795
Kansas	6169	131	6300	282	1982	2264
South Atlantic						279
Delaware	ND	ND	ND	ND	ND	ND
Maryland	ND	ND	ND	ND	ND	12
Virginia	ND	ND	ND	ND	ND	20
West Virginia	ND	ND	ND	ND	ND	12
North Carolina	ND	ND	ND	ND	ND	40
South Carolina	ND	ND	ND	ND	ND	20
Georgia	ND	ND	ND	ND	ND	90
Florida	ND	ND	ND	ND	ND	85

State	Number of Lots by Capacity: 1000 Head and Less	Number of Lots by Capacity: Over 1000 Head	Number of Lots by Capacity: Total	Fed Cattle Marketed: Lots Under 1000 Head Capacity	Fed Cattle Marketed: Lots Over 1000 Head Capacity	Fed Cattle Marketed: Total
				(Thousand Head)		
South Central						3786
Kentucky	ND	ND	ND	ND	ND	38
Tennessee	ND	ND	ND	ND	ND	26
Alabama	ND	ND	ND	ND	ND	50
Mississippi	ND	ND	ND	ND	ND	26
Arkansas	ND	ND	ND	ND	ND	38
Louisiana	ND	ND	ND	ND	ND	26
Oklahoma	314	41	355	18	497	515
Texas	921	179	1100	50	3017	3067
Western						5598
Montana	102	50	152	23	109	132
Idaho	504	59	563	13	317	330
Wyoming	ND	ND	ND	ND	ND	55
Colorado	344	193	537	140	1698	1838
New Mexico	5	39	44	1	260	261
Arizona	3	48	51	1	728	729
Utah	ND	ND	ND	ND	ND	76
Nevada	ND	ND	ND	ND	ND	66
Washington	160	21	181	40	273	313
Oregon	310	23	333	37	112	149
California	28	128	156	7	1642	1649
Alaska	ND	ND	ND	ND	ND	ND
Hawaii	ND	ND	ND	ND	ND	3
23 State Total	136262	1764	138026	7275	13219	20494

Source: SRS, USDA

upon the marketing system for methods that minimize cattle stress, death loss and handling costs. A related problem of interstage coordination is the complexities associated with assembling a large enough lot of feeders uniform enough in quality and performance characteristics to meet the feedlot needs. This may be so difficult and complex that the feedlot operator quits the task and accepts "what the market provides," discounting the price that he's willing to pay becuase he can't meet his specific requirements. Thus, even the theoretical role or expectation of price as an effective communicator or coordinating signal can't be substantiated.

Clearly, dealing with the many manifestations of size disparity is a demanding problem for any method of vertical coordination between cow/calf and feedlot enterprises.

Seasonality

The production of feeder calves and their subsequent movement into feedlots appears to be highly seasonal in nature (Table 6). While only sketchy data are available, most point to both highly seasonal production and marketing patterns for calves and only a somewhat more moderate seasonal pattern to the placement of cattle in feedlots. Spring calving and fall marketing are the dominant practices. For example, almost 45 percent of the placements on feed in the seven states that report monthly occurred in the September-December period in 1975, and the average share during the autumn months has consistently exceeded 40 percent in recent years.

The seasonal pattern is more pronounced on a regional basis. Ohio data, which may typify seasonal patterns east of the high plains, shows that about three-fourths of all calves born in cow/calf enterprises are dropped in the February - April period, and that over half of the feeder calves are sold by

Table 6. Seasonal Patterns in Feeder Cattle Marketings

Month	Percent on Annual Total	
	Feeder Calves Marketed By Cow/Calf Operators (Ohio)	Placements of Cattle on Feed (Seven States)
January	4.3	6.4
February	3.3	4.2
March	2.0	8.4
April	13.3	7.6
May	5.0	8.5
June	3.0	7.6
July	3.0	6.3
August	2.4	7.1
September	6.0	11.4
October	32.4	12.8
November	18.0	10.9
December	7.3	8.8

Source: Nyanteng and Cattle on Feed

cow/calf operators in the October-November period. Data on the seasonal movement of feeder cattle and calves in Kansas and Nebraska tends to confirm this general pattern, however, seasonal data on a national scale is sketchy.

Special demands are placed on the marketing and coordinating system for feeder cattle because of the seasonal nature of production and marketing. First, the overall seasonal pattern of concentrated movement of cattle from cow/calf enterprises to feedlots in the autumn creates particularly heavy logistical demands during this time of the year. Obviously, this requires capital facilities of greater capacities and cost than would be necessary with a more even seasonal flow. Additionally, it implies that many buyers, and perhaps most sellers, are in the market infrequently, often just once a year. This renders a steady flow of communications between buyers and sellers difficult, suggesting that effective coordination is encumbered due to infrequent exposure of operators in one stage to conditions in and needs of operators of enterprises in the other stage.

Another problem of coordination evolves from the difference in the magnitude of the seasonal patterns between the two stages, or the apparent disparity between the relative share of feeder calves marketed in the fall (around 50-60 percent of the total) and the share of total placements occurring at the same time (around 40-45 percent). As a result, the coordination system must accommodate a time adjustment as well as spatial and size adjustments. Perhaps, this is one of the most important reasons for the growing activity. Limited data on specialized growing enterprises in Nebraska and Kansas tends to confirm this, as 70 percent or more of the growers studied purchased feeder calves in the fall, whereas fewer than 40 percent sold feeders to feedlots during that season. Thus, the growing activity may be primarily a means of achieving coordination in a time dimension between the cow/calf and feedlot stages. If it is the most efficient and effecti

means for this appears to be a relevant question.

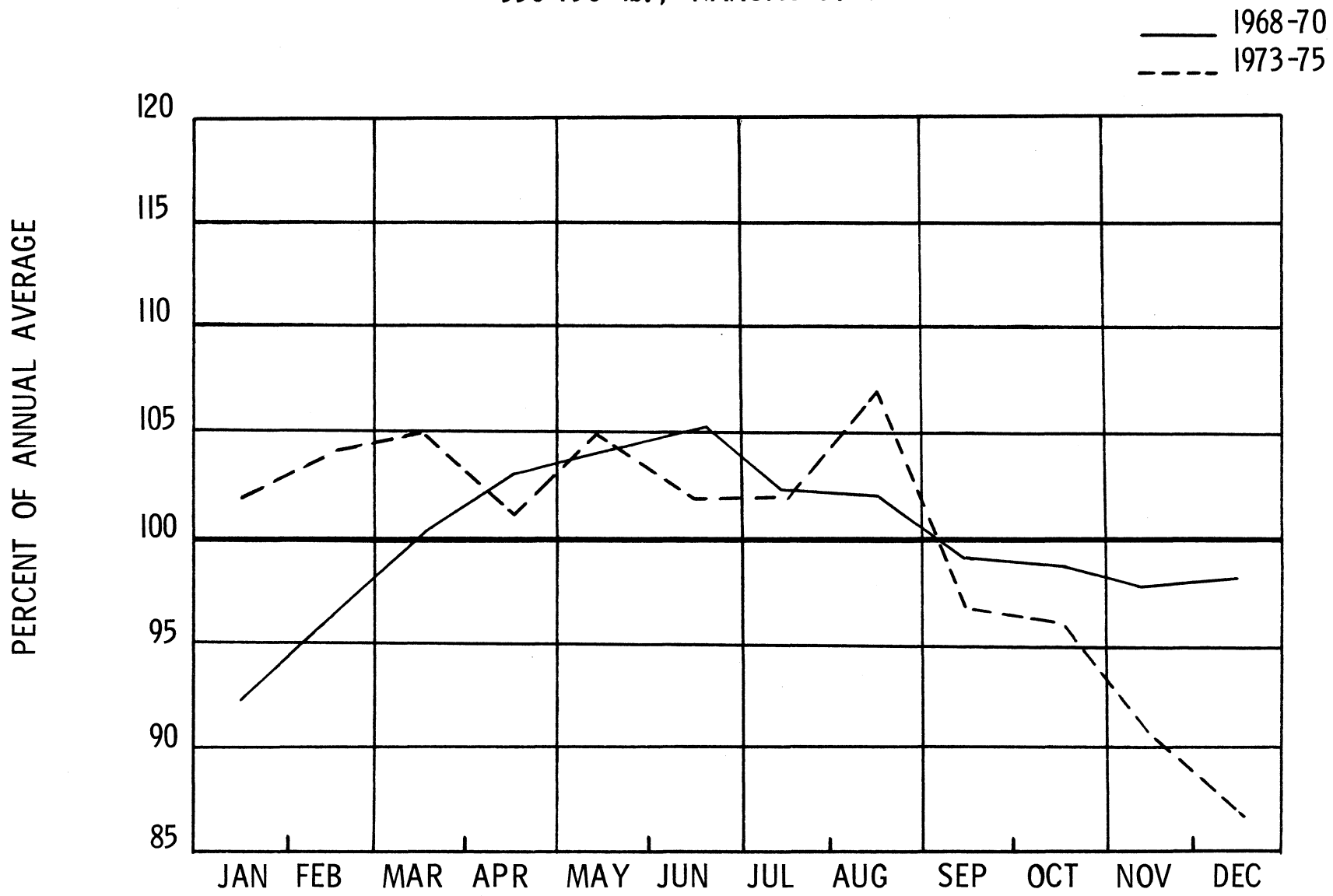
An additional observation related to seasonality concerns price, and seasonal price movements. Not only do marketings of feeder cattle tend to be the greatest in the fall, the prices tend to be at their lowest levels at that time as well (Figure 4). While it is theoretically consistent for prices to be lowest at times of greatest supply, a nagging question is, why doesn't the spring price premium bring about relative increases in spring marketings? The answer may rest, in part, on this very seasonal nature, combined with size and spatial considerations.

To the extent that only small and infrequent spring offers are made in rather widely dispersed areas, buyers may despair from seeking out supplies in these areas in the spring. Thus, the higher spring prices evidenced in major markets may not be fully reflected in low volume areas. Our analysis of prices at the Cincinnati and Kansas City terminals tends to confirm this. For example, between January and May, 1975, feeder cattle prices rose about 35 percent on the large, Kansas City terminal while they increased less than 23 percent in the small volume Cincinnati market. Thus, again the available evidence suggests that price signals cannot, or at least aren't facilitating effective vertical coordination.

Product Characteristics

Feeder cattle are heterogeneous. Wide differences exist, based upon factors such as breed, age, size, frame, condition, potential carcass quality, sex and so on. Unfortunately, no widely accepted nor uniform terminology is used to describe similar cattle. This is particularly noticeable for quality grades, where different variations and standards are used in different states and regions and at different points in time. Virginia medium, Kentucky grade, number 1 Okie and medium choice are just a few of the grades commonly used; these in addition to the U.S.D.A. grades used in some areas. The heterogeneous nature of the commodity combined with the inconsistent and nonstandard grading systems used increases the complexities of coordinating the types and quality of feeder cattle produced

Figure 4. FEEDER STEER PRICES, CHOICE 550-750 lb., KANSAS CITY



in cow/calf enterprises with the demands of the feedlot stage.

Related to this problem is a reported lack of agreement between operators in these two stages over what constitutes value in a feeder animal. Purcell's work has clearly demonstrated that a significant difference in opinion can exist between feeders and producers on what characteristics give value to feeder cattle. Generally, most feedlot operators opt for stretch or frame and not much finish; cow/calf operators apparently prefer more heavily finished animals. As a result, feeder cattle producers may be supplying livestock that don't possess the characteristics most desired by buyers. This suggests that not only is communications between producers and feeders with regard to type and quality inadequate and that the pricing system is not providing accurate differentials based upon quality, but that the existing marketing and coordination system functions in such a way as to isolate the quality preferences of each group from the other, else little product flow would actually occur.

With this as a basic overview of the nature of the problems encountered in achieving effective vertical coordination between the cow/calf and feedlot stages that stem from structural and product characteristics, attention is now turned to a brief examination of some of the more important historic, present and perhaps futuristic mechanisms and methods used to facilitate interstage coordination and exchange.

Methods and Systems of Vertical Coordination

For the most part, vertical coordination in the cow/calf-feedlot segment of the beef subsector is accomplished through various types of market exchange systems. These range from open systems such as public terminals and auctions to more direct but relatively closed systems such as private negotiations. Vertical integration is also evidenced where the task of interstage coordination is internalized within a single firm or management enterprise. Additionally, as has been discussed above, specialized growing operations also perform a coordination function. In this section we attempt to estimate, based upon the limited empirical data available, the relative importance of alternative marketing and coordination mechanisms and to highlight some of the more obvious strengths and weaknesses of each.

Feeder cattle move through a variety of channels and combinations from cow/calf operations to feedlots. No hard and fast data are available that can be used to measure precisely the magnitude of movements through various channels and exchange mechanisms nor the precise number of times feeder cattle are exchanged from the time they are sold from the cow/calf enterprise until they reach a feedlot.

Clearly, many feeder cattle are handled by several intermediates between the cowherd and feedlot. Engleman estimated that in 1973 each calf placed in a feedlot changed hands on the average of one and one-half times. He also suggested that half the feeders go through public markets two times. Some animals go through as many as four separate shipments from calf producer to feeder. Using the 1972 data Engleman collected from 30 selected public markets and the number of feeder cattle selected dealers handled, a conservative estimate can be made that about 55% of the feeder

cattle placed on feed exchanged hands at least twice before reaching the feedlot.

Based upon a number of regional studies that have been done over the past several years (Newberg, Smith, Jorgensen, Raikes, Henderson and Nyanteng) a general picture can be constructed of the relative importance of alternative marketing channels or coordinating systems from the viewpoint of the first handler beyond the cow/calf enterprise (Table 7). Second, third and other multiple handlings are not reflected and, aside from Engleman's estimates, there seems to be little data available for tracing out the nature of such multiple handlings. Very sketchy information suggests, however, that order buyers are probably the most important second handlers and that second handling may be the most important activity of these persons.

Table 7. Vertical Coordination in the Cow/Calf to Feedlot Segment of the Beef Subsector: Method of First Handler Exchange

FIRST HANDLER EXCHANGE	PERCENT BY REGION 1/			
	REGION I	REGION II	REGION III	U.S.A. 2/
Auction Market	75	58	52	59
Direct	7	38	37	33
Order Buyer	2	1	5	2
Terminal	3	2	4	3
Vertically Integrated (Raise, Contract, Etc.)	13	1	2	3
TOTAL	100	100	100	100

1/ Region I: North Atlantic, East North Central, South Atlantic, Minnesota, Kentucky, Tennessee

Region II: Missouri, Alabama, Mississippi, Arkansas, Louisiana, Texas, Oklahoma, West

Region III: Iowa, North Dakota, South Dakota, Nebraska, Kansas

2/ Conterminous 48 states

Source: Derived, see Appendix for method.

In a 1957 survey of cow/calf producers and livestock markets, Newberg determined that about 82 percent[1/] of the feeder cattle purchased in the North Central region plus Kentucky went into feedlots. Of the feeder cattle sold, about 50 percent were sold through auctions, 19 percent through terminals, 12 percent through dealers, and 18 percent direct, by private treaty. The balance went through other miscellaneous markets. At that time, 45 percent of the feeder calf purchases in the North Central region were made at auctions, 12 percent at terminals, 17 percent from dealers, 1 percent from coops and the balance from other sources. Newberg also found that 80 percent of the farmers interviewed had only one outlet through which they sold feeder calves.

Henderson found in a 1972 study of cow/calf producers in the Appalachian region that over 80 percent of the feeder calves sold by the region's farmers went through auctions, while 9 percent went directly via private treaty sales to other farmers or feedlots and the remaining 6 percent went through dealers and other methods. Nyanteng found that almost 63 percent of the Ohio calf producers he surveyed used auctions of some type to sell their calves. About 8 percent used private treaty sales direct to feedlots, 3 percent sold through order buyers, another 3 percent used local dealers, about 4 percent used coops, and almost 11 percent had some form of a forward or prearranged sales agreement with a buyer.

Raikes assembled data showing that in the 1966-67 feeder calf marketing season auctions accounted for between 47 and 61 percent of the feeder calf sales, while direct sales ranged from 37 to 48 percent. Terminals ranged from less than 1 percent to about 5 percent of the total. Gaarder indicated that between 1957 and 1970 the main livestock marketing method

in South Dakota evolved from public stockyards to auctions. For the period he had data (1957-1964) feeder cattle accounted for most of those livestock marketings.

Jorgensen found in an analysis of specialized growing enterprises in Kansas and Nebraska that over one-forth of their feeder cattle were purchased directly at auctions. Approximately half were procured through an order buyer, most of whom originally purchased the calves at auctions although a significant number of order buyers purchased calves directly from the cow/calf operator, particularly in Nebraska. Most feeder cattle were sold (52 percent in Nebraska and 39 percent in Kansas) at auctions. About 35 percent were sold by direct methods and about 11 percent of Nebraska's feeder cattle were sold to feedlots by contract while this accounted for 20 percent in Kansas. Three percent moved through terminals.

Purcell found in a survey of Oklahoma producers and feeders that auctions tend to be the most frequently used exchange mechanism, but that producers preference is for direct sales and commission agents because they felt that these allow the seller more control over the terms of trade. Apparently, direct sales or commission selling alternatives are not generally available, however. Overall, while no uniform data are available for the country as a whole, the studies reviewed do generate a generally consistent overview of the relative importance of several alternative methods for effecting interstage coordination of feeder cattle.

Auctions

Available data indicate that auctions are the single most popular way to coordinate cattle movements from cow/calf enterprises to feedlots. These auctions are generally the traditional types where buyers gather as a group around an arena and are prompted by an auctioneer to bid on each

lot of feeder cattle assembled and displayed in the arena. Usually, each lot of cattle is available for physical inspection by buyers either prior to bidding or during bidding.

Auctions vary in sorting procedures, times of sale, buyer and seller services offered, and fees charged. Typically, auctions are local phenomenons, generally serving relatively small geographic areas. It is not unusual to find more than one livestock auction in a single country.

Auctions are popular for at least four reasons. Hill, Gaarder, Armstrong and Jorgensen, among others, found that calf producers like auctions because they are generally easily accessible and as a result many feel that they are competitive. Auctions easily accomodate non-standard or heterogeneous goods if buyers are present to see what is offered for sale. Because many producers are in close proximity to local auctions, these markets can make for relatively efficient assembly. Small heterogeneous groups of calves from different producers can be assembled, sorted and commingled into relatively uniform lots large enough to be attractive to buyers and to facilitate efficient transporation to feedlots.

However, there may be an implicit reason underlying the basic popularity of auctions (see Purcell and Nyanteng for example). Because most sellers and many buyers are in the market only infrequently and possess, at best, rather imperfect information on market conditions, available supplies, demands and the like, their ability to engage in an optimal trade is in many cases not finely honed. The fear of failure to "optimize" a selling or buying situation may lead to a desire for a certain amount of anonymity on the part of both buyers and sellers. Each can justify a non-optimum trade with the rationalization, "Well, it's the best I could do at the time."

Auction markets cushion direct buyer seller confrontation. A buyer does not have to tell a seller face-to-face that the seller has an inferior product, and he does not raise self-doubt about his ability as a buyer to correctly evaluate the sellers' offers. A parallel arrangement can be made for the seller. The basic noncollusive market place rivalry is maintained. Each participant can leave with a feeling that he did his best and any question to the contrary can be answered by faulting "them", meaning the other side of the trade as a group. Each participant can strengthen his conviction if he knows that an "indifferent" third party, the sale manager and auctioneer, sorted the calves and presented them for bid.

Several problems have been identified with local auction markets as a coordination mechanism (Johnson, Gaarder, Newberg, Henderson). Many local markets are small and frequently do not move a sufficient volume to attract a large enough number of buyers for highly competitive bidding. Secondly a small number of buyers appears to lead to collusion among buyers in some instances. Third, the spot nature of local auction sales often results in volatile price movements, depending upon how many buyers and sellers turn out on a given sale day. Frequently, public dissemination of prices at auction markets separated by both space and time is inadequate to generate accurate arbitrage, thus resulting in further price distortions. Because the seller, in effect, makes his decision to sell when he brings his cattle into the auction yard and before the settlement price is known, his power in the market is constrained relative to the buyers.

Auctions tend to be expensive. The auctioneer and support staff must be paid. Yardage costs are incurred for assembly, handling and boarding when cattle remain in the yard for a lengthy period. Buyers' costs are relatively high as they often must travel considerable distances and visit

several widely dispersed auctions in order to fulfill their needs. Another cost-related problem is shrink, disease and death loss. Multiple sorts, irregular feeding and watering, strange surroundings, commingling with unfamiliar cattle and tension can cause animals to lose tissue and weight, spread disease, increase death rates and hinder subsequent performance in the feedlot (Henning, Hoffman, Jorgensen, Henderson).

Terminals

Terminals (Stout) are referred to as central markets, public markets, public stockyards, open markets and posted markets. Terminals are also referred to as centralized or indirect markets because livestock are shipped by the seller, who retains title, to the central market. The seller engages a commission agent to act as his representative in negotiating price and other terms of the sale. The centralized nature of terminals means that, theoretically at least, much larger volumes can be handled than in local markets.

Terminal markets, to the extent that they realize large volume, centralize the price discovery process, thus, prices tend to more accurately represent actual supply/demand conditions, compared to small volume markets. This potential for accuracy in the price discovery process is probably the single most important advantage to terminal markets. Likewise, as Frahm and Schrader suggest, centralized markets lead to more perfect market information.

As is frequently the case in auctions, the seller makes the decision to sell when his cattle are shipped and consigned to a commission firm. He does not know the actual settlement price until after the sale is consumated, well after he has made that decision. Thus, the producer has relatively little market power when selling through terminal markets,

compared with buyers. That is, while sellers at terminals have some control over daily flow, they have little direct influence on pricing. The burden of making an acceptable agreement is transferred by the seller to his agent.

A terminal marketing system is a relatively high cost method of assembling and transporting feeder cattle because of their centralized nature. That is, transportation and assembly costs and cattle stress associated with moving long distances to and from centralized terminals are typically much larger than in market systems where more local assembly occurs.

Rhoads and Johnson found that terminal service charges are considered too high by many. Selling agents must be paid and "boarding" charges covered before the seller receives his return. Johnson, in his analysis of eight market alternatives for coordination in the cattle industry, ranked terminals as the third most expensive overall.

That the limitations to terminal markets outweigh their advantages, as a means for facilitating interstage coordination for feeder cattle, is suggested by the observation that only about three percent of the nation's feeder cattle move through terminals, at least at the first handler level (Table 7).

Order Buyers

Order buyers, sometimes called feeder buyers, are agents that act on behalf of their clients, purchasing feeder cattle on their customer's account. As a first handler, order buyers are no more important than are terminal markets, accounting for roughly two percent of the first handler marketings (Table 7). However, very sketchy information gathered by Engleman and Jorgensen suggest that order buyers are much more important as second handlers in the cow/calf to feedlot coordination process (Table 8). Perhaps for 90 percent or more of the feeder cattle handled by order buyers

they are the second handler in some cases, although extreme caution must be exercised in drawing any conclusions about second handler activity in general. There is simply a significant void of information available when it comes to the activities of second handlers of feeder cattle.

Table 8. Feeder Cattle Moving Through Two or More Coordinating Methods

Method of Coordination	From Engelman[1] Data	From Jorgensen[2] Data	
	Percent of Total		
		Neb.	Kan.
Auction	ND	23	13
Direct	ND	18	33
Order Buyer	95	47	31
Terminal	86	3	3
Contracts	ND	9	20

1/ See appendix

2/ Table 21 - Table 8, in Jorgensen, et.al.

Order buyers apparently operate across all markets. They may purchase cattle in local auctions, on central exchanges, or directly from producers. They may be very efficient in assembling and moving feeder cattle from producer to feeder because they deal in large volumes, however, little empirical evidence is available to support this supposition.

Order buyers are generally well informed about market conditions, prices, available supplies and the like; better informed in most cases than sellers. Dealing from a position of unbalanced market information gives the order buyer a degree of market power vis-a-vis less-well informed sellers. Additionally, the order buyer acts on the order of the buyer and, thus, represents his interests. This does little to create a competitive pricing system that results in prices which can serve as accurate guides to resource allocation.

Direct Negotiation (Private Treaty)

Second to the auction, direct negotiation between cow/calf operators and feedlot operators is the most popular method of interstage coordination, accounting for about 33 percent (Table 7) of the U.S. feeder cattle movements. Nearly all the literature cited, explicitly or implicitly, enumerates the reasons. The largest single reason seems to be the heterogeneous, unstandardized, localized nature of the seller's market, thus, direct negotiation may be required to gain the desired interstage coordination. This is related to the fact that market information on quality characteristics and goals of market participants does not flow efficiently between sellers and buyers (Purcell and Nyanteng).

Those utilizing direct negotiations feel they can better control the variables affecting successful coordination, particularly with regard to cattle type and quality. Many buyers distrust the health and quality of cattle they cannot personally inspect. Direct negotiation affords them this opportunity. Additionally, handling costs may be reduced to the extent that an intermediate assembly yard can be avoided through private treaty sales. However, to gain this advantage, it must be limited to larger sellers.

Direct negotiation may have certain appeal to those buyers and sellers that enjoy a contest. Price may not be so important relative to prices in other markets, but rather it may be a relative score, measuring success or failure for each participant in the negotiating confrontation. If this is the case, the ability of price to function as a resource allocator is even further encumbered.

Direct negotiation markets are decentralized spot markets by nature, thus, effective information flow across a representative sample of all

transactions is very difficult to achieve. The burden of seeking out and evaluating available market information rests solely with each participant (Armstrong). This is not only a costly function, but also one that is fraught with externalities and inequities.

The buyer assumes additional costs in direct negotiations, as it normally falls upon him to seek out sellers and procure an adequate supply. This "search and find" kind of activity can be expensive, particularly given the generally small size of the typical cow/calf enterprise. In this regard it is interesting to note that direct negotiation is more popular in those areas of the country where cow/calf operations tend to be large. This suggests that private treaty sales, as a means of vertical coordination, may be substantially limited in potential due to the typically small size of most cow/calf enterprises.

Vertical Integration

Vertical integration is not a new concept. In general it means that two or more adjacent stages are directly controlled by the same entrepreneur, normally through common ownership of both stages or a highly specific contractual arrangement such as a custom feeding contract. It does not rely on market exchange to effect interstage coordination, rather it operates on the premise that the entrepreneur makes all allocative decisions within and among the integrated stages as a part of his management function.

Vertical integration between the cow/calf and feedlot stages appears to occur only infrequently (Table 7). However, Raikes reports that integration and contracting activities tend to ebb and flow over time, with no convincing upward or downward trend evident. Perhaps, this suggests that relative advantages and disadvantages of vertical integration as a means

of achieving interstage coordination are either not readily apparent to entrepreneurs, or change as economic conditions affecting the grain/livestock sector change. In either case, it suggests that much is still to be learned about the relationships between integration and coordination.

More integration is evidenced between either cow/calf enterprises or feedlots and the intermediate coordinating activity, growing, according to Jorgensen's study. He found that a clear majority of the operators who are engaged in growing activities are either cow/calf or feedlot businesses. To the extent that the growing function is important to vertical coordination between cow/calf and feedlot stages, perhaps more operators in each of those stages are including some growing activities in their enterprises as a means of facilitating improved coordination with the other stage. This suggests that the growing activity, be it a part of either the cow/calf or feedlot stage, may deserve more careful analysis as a mechanism to achieve effective vertical coordination.

What limited evidence that is available suggests that, from the viewpoint of the cow/calf operator, the single most important advantage associated with feeding cattle to slaughter weights is revenue stability. Our analysis of feeder cattle and fed cattle prices over a six year period reveals that, on the average, fed cattle prices fluctuate significantly less from month to month than do feeder cattle prices. Thus, the gross revenue returned on fed cattle in terms of price per cwt. appears to be more stable over time and less subject to sharp fluctuations than is the gross revenue returned to feeder cattle.

This does not mean, however, that the profit stream from fed cattle is necessarily greater than that from feeders. By carrying calves over on feed, the cow/calf producer assumes additional risks with regard to

things such as feed prices and health problems. Working capital requirements also expand. By placing cattle on feed, the cow/calf operator does not have a cash inflow at the time his calves reach marketing weight as feeders. Furthermore, he has additional demands for cash outflows necessary to finance feed and feedlot operations. Many cow/calf operators have neither the working capital nor available management resources necessary for vertical integration into feedlot operations. Likewise, limited capital may be a constraint on the backward integration of the feedlot operator into a cow/calf enterprise. Improved knowledge of the coordinative gains and losses associated with integration would be useful in evaluating the importance of such capital constraints to overall performance in these two stages of the beef subsector.

Non-Traditional Marketing Methods

Vertical coordination is an evolutionary process. Certainly, the existing methods for facilitating interstage coordination are not the only methods that can be used, and perhaps are not even the most ideal even under optimal conditions. The search for new alternatives goes on. Two of the more interesting proposals that have been suggested in recent times are the electronic market and the selling pool.

The electronic market, as manifested in things like the telephone auctions that have developed for feeder pigs and market lambs and the teletype auctions used extensively in Canada for butcher hogs, appears to have the potential capability to make price function more effectively as a means for improving interstage coordination for feeder cattle. Likewise, the selling pool, as suggested by Kendrick, may have the potential to extend effective non-price coordination to the large number of small enterprises that dominate, particularly in the cow/calf stage. Any thorough

examination of vertical coordination between the cow/calf and feedlot stages of the beef subsector should give careful consideration to these and other evolutionary systems.

Concluding Comment

This paper has attempted to present within a reasonable length, an overview of "what is known" with regard to interstage coordination in the cow/calf-feedlot segment of the beef subsector. Obviously, much has been excluded. Some because while it may be known, it wasn't known to the authors. And other, because in the authors' judgement, it wasn't relevant. We have attempted to present what is known in a framework that leads to improved understanding of not only what is known but also what is not known that is worth learning. That framework, quite simply and as stated at the outset, assumes that the performance of the cow/calf-feedlot segment of the beef subsector is at least partially a function of the types of activities that are engaged to coordinate enterprises in this segment with one another. Further, it assumes that the types of coordinating activities used is a function of the character of product and the structure of enterprises and industries.

From this overview flows a multitude of questions: why doesn't price do an effective job of allocating resources between these stages? How can the pricing system be improved? What is the trade-off between specialization and integration? How extensive is multiple handling? What are the implications of multiple handling? Why does it come about? To what extent are some marketing methods designed to isolate these two stages from each other, rather than coordinate them? The list could go on, ad infinitum. In the end the questions raised would bear a close resemblance to the issues and topics for further research already succinctly articulated by

Raikes. Thus, we'll not attempt such a reiteration.

Aside from the obvious questions, what has been accomplished? First, areas of insufficient data have been discovered. Thus, some insight has been gained into what information is, and isn't available. Secondly, and we believe more importantly, the nature of possible interrelationships between the structural characteristics of these adjacent stages or industries, the kinds of interstage or interindustry coordinating behavior that exists, and economic performance has been suggested. These, in turn, provide a basis from which research hypotheses can be derived. Research hypotheses, in turn, lead to mathematically quantifiable and statistically testable hypotheses. And, quantifiable and testable hypotheses lead, in turn, to identification of relevant data needs. So armed, data collection is purposeful; it leads to knowledge.

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Appendix. Derivation of FIRST HANDLER EXCHANGE PERCENTAGES by Regions.

The 48 conterminous states were grouped into three regions by comparing the beef cow herd size distribution and percentage of farms in each size group. Minor adjustments were made placing states within each region so that like profile states would be contiguous. "Cows other than milk cows" from 1969 U.S. Census of Agriculture used.

Three general regions were chosen because the market study data available was limited. Region I percentages were based on data studies by Newberg (1959), Henderson (1972), Nyanteng (1976); Region II percentages by Raikes (1974); and Region III by Jorgensen et al. (1974) and Smith, et al. (1975).

Within each region, survey data was combined by using either the number of cattle represented in each study or the number of cattle marketed in each state for which data was available, as weights.

Method used to derive DOUBLE MOVEMENTS from Engleman data.

Using 1972 feeder cattle placements for the 23 states from SRS Cattle on Feed reports and estimating for the remaining 27 states, total 1972 placements for 50 states were estimated at 27,870,000 head. Applying extrapolated percentages from Table 7, text,to these total placements, it was determined that 16,443,300 went through auctions one time, 9,197,100 went directly to feedlot operators, 557,400 went to order buyers, and 836,100 went to terminals. Engleman calculated 10,534,000 head went through order buyers. The 557,000 estimated to have actually been sold by producers to buyers were subtracted from the 10,534,000 leaving 9,976,000 being counted twice. This is 95% of the recorded transactions. The same procedure was used for terminal sales.