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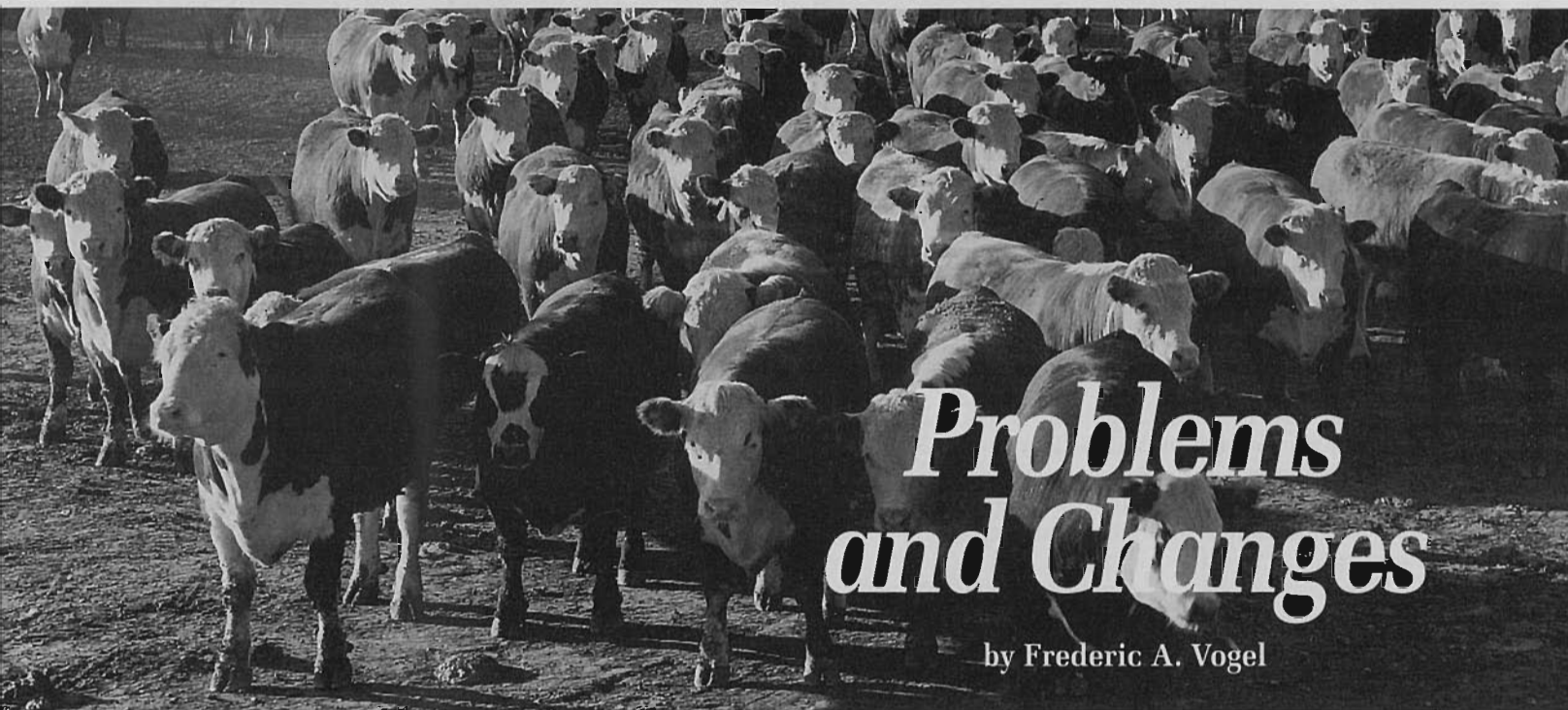
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CATTLE-ON-FEED ESTIMATES:



Problems and Changes

by Frederic A. Vogel

➤ Many people in the United States have a stake in the accuracy of USDA/NASS estimates of the number of cattle-on-feed. These numbers are indicative of the supplies of beef and, therefore, of prices producers will receive for beef cattle, prices traders and processors will be paying for beef cattle and beef, and the price consumers will be paying for beef products. Errors in these estimates lead to management decisions by producers, traders, and processors that eventually prove to be inconsistent with actual market conditions and, therefore, costly to them.

In the late 1980s the trade became very critical of the National Agricultural Statistics Service (NASS) when the "cattle-on-feed estimates" became less reliable indicators of future beef cattle marketings and beef slaughter. In response, NASS initiated a careful evaluation of the procedures followed to develop these estimates. On the basis of this evaluation, several changes have been initiated.

In the late 1980s the historical relationships between cattle-on-feed inventories and the estimates of the number of animals by weight group were not accurately projecting future slaughter. In addition, the expected marketing estimates were also not accurately projecting slaughter. As Figure 1 shows, the spread between expected and actual marketings increased beginning in 1990. This increase was caused by a combination of factors. Feedlot managers had increased the length of the feeding period for their lighter animals. The lots themselves

overestimated their marketings. The overestimates were compounded by NASS also overestimating expected marketings on the basis of data showing cattle numbers by weight groups. The relationship between expected marketings and actual marketings was further affected by cattle being fed to recordbreaking weights for slaughter. These factors led data analysts to think that USDA was overestimating the number of cattle on feed.

The Response

In response, NASS conducted a complete review of all survey data, all slaughter data, and all estimates during the June and July 1991 period. The purpose was to determine if any major revisions in the procedures would improve the accuracy of the estimates.

NASS also evaluated data collection procedures in the 13 states that have the largest number of cattle on feed. Procedures followed to analyze and review the data collected were reviewed for each state. These reviews focused on how each state maintained its sample, how it conducted the survey of those feedlots included in the selected sample, and how survey data were processed and reviewed.

More extensive reviews were conducted in Nebraska and Iowa than in the other states. These two states were chosen for intensive review for two reasons: First, these two states account for about 30 percent of the total marketings from the 13 states. Second, like Illinois, Minnesota, and South Dakota, Nebraska and Iowa have a large number of lots with a capacity of less than 1,000 head. In fact, 40,000 of the estimated 44,000 total number of feedlots with capacities of 1,000 head or less in the 13 states are in five states—Nebraska, Iowa, Illinois, Minnesota, and South Dakota. It was felt that data collection problems were more likely associated with the smaller lots. In the 13 states 95 percent of the feedlots account for only 15 percent of the marketings.

The small lots pose special problems in that it is necessary to not only estimate the number of cattle on feed, but also it is necessary to do extensive "list building" to estimate the number of

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NASS Cattle-On-Feed Surveys

The National Agricultural Statistics Service (NASS) conducts monthly and quarterly surveys of the cattle-on-feed industry. The monthly surveys encompass the 7 major states which account for over 70 percent of U.S. fed cattle marketings. The quarterly surveys include 6 additional states and cover a total of about 85+ percent of fed cattle marketings.

The data collected from feedlots vary between the monthly and quarterly surveys. Each sample feedlot in a state which generates monthly estimates is asked to report the total number on feed at the beginning of the month, the number placed on feed during the previous month, and the number marketed during the previous month. More extensive data are collected from all 13 states during the quarterly surveys (January, April, July, and October) and include:

- Total number on feed by kind—steers and steer calves, heifers and heifer calves, and cows.
- The number placed on feed during the previous quarter in the 6 quarterly states and during the previous month in the 7 monthly states.
- The inventories of steers, heifers, and calves on feed in 5 different weight groups.
- The number marketed during the previous quarter in the 6 quarterly states and the previous month in the 7 monthly states.
- The number expected to be marketed the next quarter.

The primary purpose of the cattle-on-feed survey is to provide data users, feedlot managers, and others the ability to project future marketings, future slaughter, and, in turn, the price they will be receiving in the next several months. The weight group data should provide a picture of the distribution of the flow of fed cattle to slaughter from the next month to 5-6 months away.

Each NASS State Office strives to keep as complete a list as possible of all operations feeding cattle. The list maintenance procedures are easier in states where the feeding industry is dominated by large lots and most difficult where there are many farm-feeder operations that go in and out of business. Two examples are shown in the following table of the cattle-on-feed lists maintained.

Table 1.
Feed Lot Numbers and Proportion Surveyed Vary

Feedlot Size	Cattle on Feed Colorado		Cattle on Feed Nebraska	
	Number	in State in Survey	in State	in Survey
Less than 1,000	119	112	6,890	615
1,000 +	176	176	510	421

Several different statistical procedures are used to translate the reported cattle-on-feed survey data into the estimated numbers on feed, placed, and marketed. A brief description of these procedures follows:

Direct Estimate. The survey average number of animals on feed in each size group multiplied by the number of lots in that category and summed to reach a state total.

Ratio to Previous Month. This estimate is based on measuring the percent change in number of animals on feed as reported by feedlots in the sample for two consecutive months. The average percent change by size group is weighted across size groups to obtain a state estimate of month-to-month change. This weighted percent change is multiplied times the previous month's official

estimate. Note that this ratio estimate is dependent upon the accuracy of the previous month/quarterly estimate.

Ratio to Base. The January 1 survey is the largest and most extensive survey conducted during the year. This estimate is similar to the ratio to previous month except the current numbers are always matched against the January reported data. This ratio estimate is dependent on the accuracy of the January 1 estimate.

Each estimating procedure has relative strengths and weaknesses. The direct estimate stands alone in that it does not depend upon the accuracy of the previous month or January 1 estimate. However, it can contain a bias if the number of operations in each size group is not correct. The two ratio estimates provide very good measures of change from month to month and from the January 1 base. Consideration attention is required to assure they do not drift in one direction or another. Much reliance is placed on the two ratio estimates, but only because slaughter data are available against which to benchmark marketings and, indirectly, inventory levels.

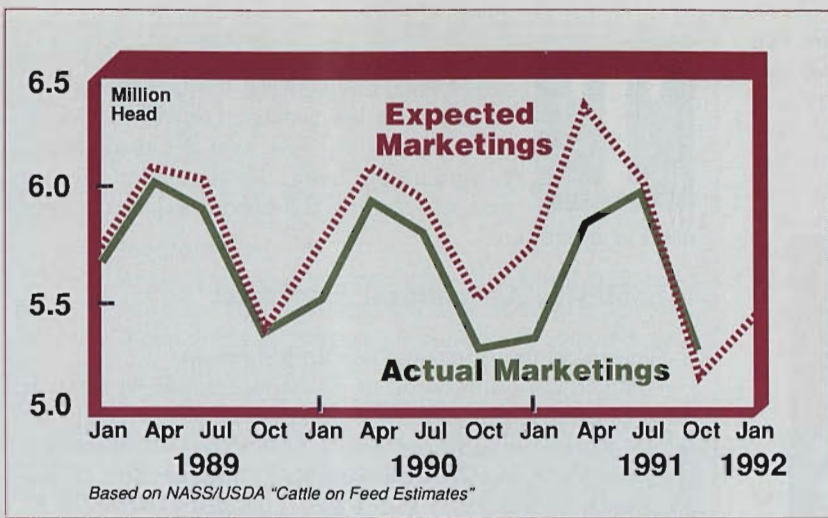
Each month the direct estimate, ratio to previous month and ratio to January are computed for the total inventory. Since not all respondents report placements and marketings, placement and marketing ratios to inventory are computed across questionnaires containing all components. For that reason, the inventory estimates are more precise than the marketing and placement estimates. The next step is to review these survey estimates using a balance sheet incorporating slaughter information.

Table 2.
Monthly Cattle-On-Feed Balance Sheet,
7 States, 1992 – non-fed slaughter.

Beginning Inventory	8203	8155	1.4
Placements Current Month	1472		4.9
Total Supply (A)	9675		
Steer & Heifer Slaughter (7State)	1447		
Other Disappearance	120		9.9
Total Disappearance (B)	1567		
Balance Sheet Inventory (A-B)	8108		
Marketing	1400	4.0	
Current Inventory	8155	1.2	
Residual	47		

Each survey component has a measure of sampling variability. The total inventory sampling variability is usually less than that for the other components. Using slaughter to check marketings provides a basis to make adjustments in the survey estimates of the components to arrive at the official estimates. The residual is a measure of unexplained error in the estimated inventories in both previous and current surveys and in the estimated placements and marketings. It is also a partial measure of non-fed slaughter.

The steer and heifer slaughter for the 7 states is estimated to be about 70 percent of the U.S. total. To some extent, this percentage will fluctuate from month to month and actual departures will be reflected in the residual. The most accurate component of the estimate is total inventory. Within the range of the variability in the survey data, adjustments can be made in the marketing, placement, and inventories to minimize the size of the residual.



these small feedlots. The small feedlots pose another problem in that they may be full with cattle for slaughter at one time while at other times, they will be backgrounding stockers or will be empty.

In addition, the meaning of the concept "cattle on feed" has been intensively studied. This part of the evaluation focused on feedlots of all sizes. It has become increasingly difficult to determine when animals were to be counted as being "on feed." Prior to the 1991 study, the "on feed" definition had been modified. Managers of individual feedlots were interviewed in order to evaluate alternative meanings of the concept. On the basis of these efforts, the definition was changed from "All cattle and calves being fattened on full feed for slaughter market" to "All cattle and calves being fed a ration of grain, silage, hay, and/or a protein supplement to be marketed from your feedlot(s) for slaughter."

The new definition was tested and evaluated in 6 of the 13 states. The conclusion was that data could be reported more consistently and accurately over time. The new definition was implemented in Nebraska in February 1990; in Arizona, Colorado, and Kansas in June 1990, and in California, Idaho, Iowa, Minnesota, South Dakota, and Texas in July 1990. By October 1990, all 13 states were using the new definition.

Although the change in the definition of cattle on feed received much publicity and criticism, it is an improvement over the previous procedure. The definition change allows younger, lighter weight animals to be included as cattle on feed. However, the new definition excludes animals that are being backgrounded in lots and that may be returned to grass before ending up in a feedlot to be fattened. The net effect was no change in inventory levels based on the definition change.

Other Changes

The review of survey and slaughter data showed that the weight group estimates needed to be improved. A large number of feedlots were reporting the total animals on feed, marketings, and placements, but they were not providing information about the number of animals by weight group. Thus, an intensive effort is going into improving the data collection of weight group data.

The review of the estimating procedures pointed out a need to change how 7- and 13-state level estimates are determined. At the 7- and 13-state levels, slaughter data can be used to evaluate survey data on marketings. The slaughter data cannot be used the same way by each state. Therefore, since July 1, 1991, instead of relying on each state to determine the best estimates based on survey data alone, the first step is to use the combined 13 and 7-state data to determine inventory levels and then allocate them among the States.

The data review also pointed out the need to improve data processing procedures. Because of resources, it has not been possible to develop a data base of cattle-on-feed survey data, slaughter data, and the various cattle-on-feed estimates. Plans are underway to put all components of cattle-on-feed data into an interactive data base and have it operational by the end of 1992.

In addition, a significant change in data collection procedures has been implemented in the cattle-on-feed survey. The January 1 cattle-on-feed and the January 1 cattle inventory surveys have historically been two independent surveys. Starting with the January 1, 1992 survey, these two surveys have been integrated into one sample and one survey. The net effect is that the entire cattle inventory sample was increased from about 62,000 interviews to 77,000 interviews.

All 77,000 respondents are asked to report both total inventory and cattle-on-feed inventories. The same methodology will be used for the July 1 cattle-on-feed and cattle-inventory surveys. The intervening monthly and quarterly survey samples will be based upon subsamples from the January 1 integrated cattle and cattle-on-feed sample. This allows NASS to use the most up-to-date statistical methodology for the cattle-on-feed survey.

The survey process for each of the monthly and quarterly surveys has also been strengthened. In the past, all large lots were accounted for, but small lots received a questionnaire through the mail. Only those choosing to return the questionnaire were included in the survey estimate which could lead to a bias in the estimates if those returning the mail questionnaire were not representative of those choosing not to respond by mail. Starting with February 1992, a fixed sample was selected, and data were obtained from all lots in the fixed sample.

The revision policy has been changed. Previously, revisions were only made at the end of each calendar year based upon all available survey data and slaughter data for the previous year and 5-year intervals using Census of Agriculture data. The policy now is that the estimates for the previous month in the monthly states and the previous quarter for all 13 states will be open for review when the current estimates are reviewed. If slaughter data or current survey information indicate the previous quarter or previous month needs to be revised, they will be revised. This will allow analysts to have the most current up-to-date information to relate cattle-on-feed inventories with slaughter to make projections for the upcoming months.

All data will still be open for review at the end of the calendar year. For example, the change in survey methodology, instituted in January 1992, provided a better benchmark of total cattle-on-feed inventories and pointed to a need to revise the cattle-on-feed inventories back to October 1990. This revision process extended back further into 1990 and included revisions of marketings and placements to link into the October 1990 inventory. In addition, the 5-year Census of Agriculture will be used as in the past. However, the monthly/quarterly review process will minimize the annual revisions that have occurred in the past.

Thus, NASS has initiated several changes in its survey methodology to produce improved cattle-on-feed estimates. These methodological changes have also led to revisions in earlier estimates. For example, the January 1991 cattle-on-feed inventory was revised downward about 1-1/2 percent or about 150,000 head. This is far short of the 1 million or so some analysts were expecting. The combination of very lightweight animals being placed on feed, coupled with animals being fed to recordbreaking heavyweights, distorted the usual distributions of weight group estimates with slaughter data. □