



## Feed Outlook: Special Article

# Animal Unit Calculations— First Projections for the 2013/14 Crop Year

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Approved by the  
World Agricultural  
Outlook Board

The first animal unit projections for the new crop are reported each year in the May issue of the Feed Outlook report. This article explains the estimation process for each of the four animal units calculated by ERS—grain consuming animal units (GCAU), high protein animal units (HPAU), roughage consuming animal units (RCAU), and grain and roughage consuming animal units (G&RCAU)—and presents the initial 2013/14 estimates.

Feed use of individual grains is a component of the “feed and residual use” category in USDA supply-and-use tables. Feed and residual use represents the remaining disappearance after accounting for other uses that are directly measured, including food, seed, industrial (FSI) use, exports, and stocks. Supply-and-use estimates for corn and other feed grains are compiled using data from many sources. USDA’s National Agricultural Statistics Service (NASS) regularly conducts surveys of farmers and grain handlers to estimate annual production volumes and the level of stocks (i.e., inventories) held throughout the year; U.S. Census Bureau provides official estimates of imports and exports; and FSI use (including use by ethanol producers) can be estimated using data from several Federal agencies, including the U.S. Department of Energy. However, there is no survey or other direct measurement available for the volume of grains fed to livestock. As a result, feed use becomes part of the “residual” category of use after total supply and all other directly measurable usage categories have been estimated and accounted for in supply-and-use tables.

As a result, along with the implied volume used for feed, the feed and residual category also includes measurement errors or inconsistencies in the estimates of the other supply-and-use categories, such as production, stocks, food, seed and industrial use, and trade. Several factors may contribute to measurement error, including shrinkage due to changes in moisture content; waste and spillage during shipping and handling; volume in transit that is not reported as stocks in hand; and human error associated with data collection and reporting that can affect estimates.

## ***Animal Unit Estimates as an Indicator of Feed Use***

To provide an indicator of implied feed use, ERS calculates standardized estimates of the size of the U.S. livestock herd and poultry flock. The estimates are an effort to account for differences in the volume of feed consumed across species (i.e., hogs, cattle, broilers, etc.) to arrive at a single aggregate metric for four animal unit categories--the number of GCAUs, HPAUs, RCAUs, and G&RCAUs. Each of these animal unit measures incorporates weights that reflect estimated feed use by each species relative to the consumption of a dairy cow. The results are standardized indices of livestock populations that can be used as general indicators of feed use. The indexing procedure uses weights developed in 1969-71 (the time of the last survey). To calculate the various animal unit measures, animal numbers routinely reported by NASS are used along with estimates of horses and mules constructed by ERS (since NASS does not report these numbers). NASS reports of January 1 inventories for each livestock type are multiplied by the respective weighting factor to calculate the indices. For time periods when NASS data are not yet available, proxies are used. For instance, for some types of poultry, reports of egg production serve as a proxy to estimate the current poultry inventory.

Inventory sources vary by livestock category. NASS January 1 inventory data are used for dairy cattle, other dairy cattle, cattle on feed, other beef cattle, and sheep and goats. Poultry inventories are based on numbers of poultry raised. To be consistent with the crop production and marketing cycle, all poultry and egg production numbers are converted to a September-August year.

### ***Calculating Animal Unit Indices***

In general, the various animal unit calculations are simply the January 1 inventory for a given crop year multiplied by the appropriate factor for the livestock type. In the case of calculations for broilers and turkeys, the inventory is based on monthly data and so adjusted by using 25 percent of the previous year and 75 percent of the current year's calculated inventory, to reflect the fact that the September-November feed use quarter falls in one calendar year while most of the last three feed use quarters (December-August) fall in the following calendar year. In the case of hogs, GCAUs are based on the spring and fall pig crops, using 20 percent of the previous year's spring pig crop, 100 percent of the fall pig crop, and 80 percent of the current year's pig crop to reflect the number of pigs that are consuming feed in the marketing year.

By way of example, the GCAU calculation for dairy cattle for 2012/13 is equal to the 9.150 million dairy cows projected on hand on January 1, 2013, multiplied by the appropriate factor 1.0475, to give 9.515 million GCAUs. A similar procedure is used for other livestock types, and the GCAUs are summed to provide the total GCAU for the period. Table 1 shows the various factors applied to animal inventories to calculate animal units.

Table 1--Factors used for animal unit calculations, 5/12/2013

Animal Types	Factor			
	GCAU	HPAU	RCAU	G&RCAU
Cattle				
Dairy				
Cows	1.0475	1.0475	1.0354	1.0397
Heifers	0.1761	0.2296	0.8150	0.5662
Beef				
Cattle on feed	1.5323	0.8889	0.1585	0.6860
Other	0.0547	0.0942	0.7358	0.4729
Sheep	0.0194	0.0954	0.1715	0.1078
Goats			0.2301	0.0611
Horses and mules	0.2043		0.3953	0.3197
Poultry				
Layers	0.0217	0.0345	0.0008	0.0090
Broilers	0.0020	0.0056		0.0007
Pullets	0.0054	0.0181		0.0021
Turkey	0.0155	0.0551	0.0011	0.0074
Hogs	0.2285	0.2903	0.0294	0.1064

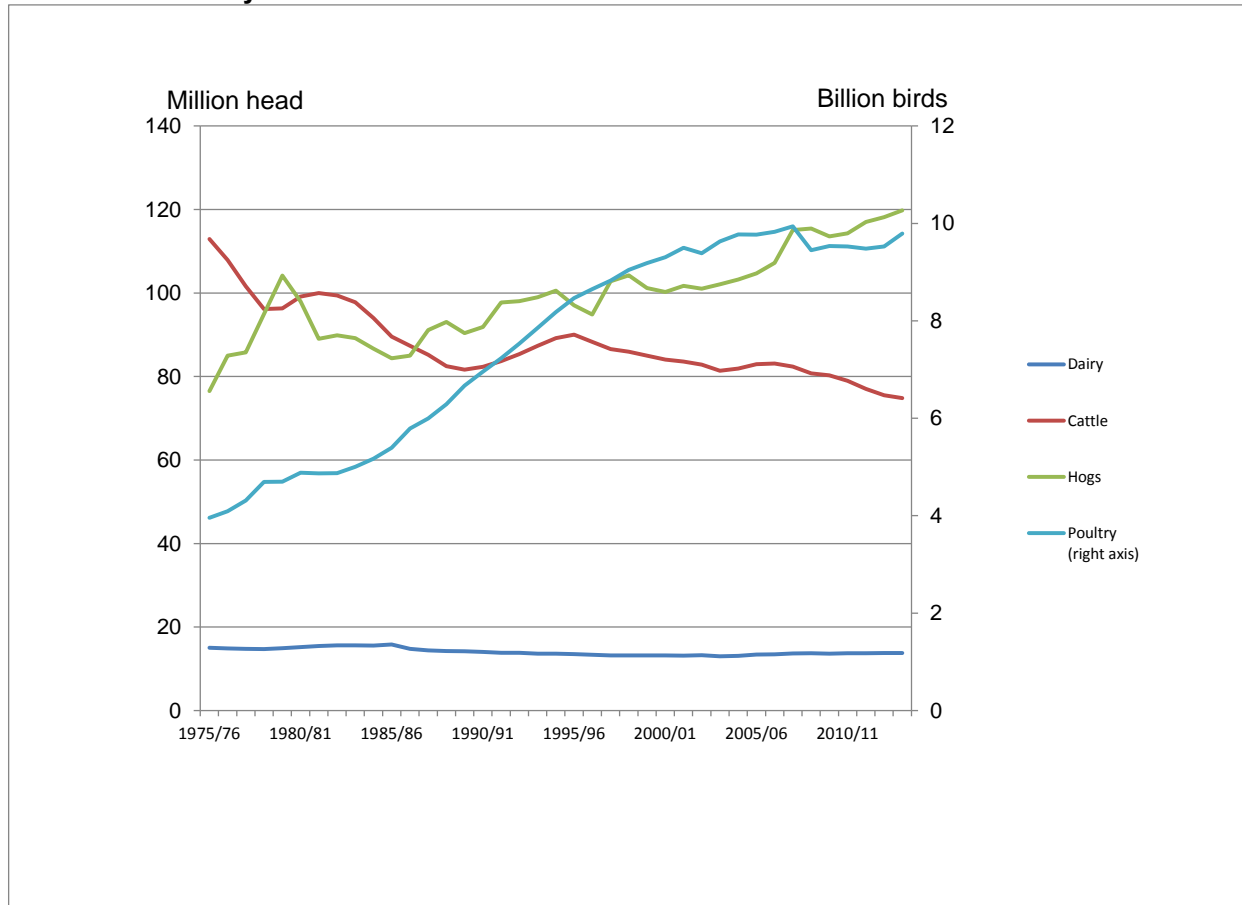
Note: The factors shown in each of the columns are those applied to inventory numbers to derive the corresponding animal unit statistic. For HPAUs, historically, dating back to the 1970s, different (although equivalent) factors were used that were applied to GCAUs instead of inventory numbers. These factors are dairy cows, 1.0000; dairy heifers, 1.3038; cattle on feed, 0.5801; other beef, 1.7216; sheep, 4.9195; layers, 1.5896; broilers, 2.7932; pullets, 3.3596; turkeys, 3.5520; and hogs, 1.2703.

Source: USDA, Economic Research Service, and supporting materials.

### ***Livestock Inventory Trends***

Livestock and poultry inventory trends are useful in tracking long-term changes in grain use for feeding. Figure 1 shows long-term inventory trends for cattle, dairy, poultry, and hogs. The changing structure of the livestock sector is apparent in the gradual decline in cattle juxtaposed to the long-term ascendancy of hogs and poultry. These trends are reflected in each livestock category's share of the various animal unit indices.

Figure 1  
**Livestock inventory**



Note: Other includes sheep, goats, and horses.  
 Source: USDA, Economic Research Service, *Feed Grains Database*

**Projected GCAUs for 2013/14**

For 2013/14, the total number of GCAUs is projected at 91.69 million units, down from 91.94 million units in 2012/13 for a decline of 0.3 percent. Of the GCAU components, poultry is expected to show the strongest advance, gaining 0.70 million units, or 2.3 percent, followed by hogs with a gain of 0.38 million, or 1.4 percent. Dairy declines by 0.03 units, or 0.3 percent, cattle fall by 1.30 units, or 5.5 percent, and other livestock are unchanged. Lower forecast feed prices will enable livestock producers to increase numbers, especially for hogs and poultry, which respond more quickly to market signals due to shorter biological reproduction cycles.

U.S. feed and residual use for the four feed grains plus feed wheat for 2013/14 on a September-August year is projected at 149.6 million metric tons, up almost 24 million tons from the previous year due to lower expected feed prices reflecting an expected increase in production with higher yields than last year, particularly for corn (table 2). Feed and residual use per grain-consuming animal unit (GCAU) is projected at 1.63 tons in 2013/14, compared with 1.37 tons last year. Figure 2 shows the relationship between feed used per GCAU over time. Because of increasing efficiency in the livestock sector, feed per GCAU has decreased steadily over time. However, rises in feed prices can alter short-term trends in feed per GCAU by encouraging livestock producers to slaughter animals at a lighter weight and put more animals (in the case of cattle) on pasture. When feed prices decline, feed use per GCAU climbs as more animals are fed for a longer period and moved to feedlots.

Table 2--Feed and residual use of wheat and coarse grains, 5/14/2013

Market year and quarter	Corn (million metric tons)	Sorghum (million metric tons)	Barley (million metric tons)	Oats (million metric tons)	Feed grains (million metric tons)	Wheat (million metric tons)	Energy feeds (million metric tons)	Grain consuming animal units (millions)	Energy feeds per grain consuming animal unit (tons)
2011/12 Q1 Sep-Nov	46.4	1.1	-0.0	0.3	47.8	-0.4	47.3		
Q2 Dec-Feb	39.1	0.1	0.3	0.2	39.8	1.2	41.0		
Q3 Mar-May	21.8	0.4	0.0	0.2	22.4	-1.9	20.5		
Q4 Jun-Aug	8.2	0.1	1.0	0.7	10.0	11.7	21.7		
MY Sep-Aug	115.5	1.8	1.2	1.5	120.0	10.6	130.6	92.6	1.4
2012/13 Q1 Sep-Nov	52.4	2.0	0.1	0.4	54.9	-0.8	54.0		
Q2 Dec-Feb	27.5	0.2	0.2	0.3	28.3	0.2	28.5		
MY Sep-Aug	111.8	2.5	1.9	1.6	117.8	7.9	125.8	91.9	1.4
2013/14 MY Sep-Aug	135.3	3.0	1.3	1.8	141.4	8.2	149.6	91.7	1.6

1/ Corn and sorghum, September 1-August 31 marketing year; Barley and oats, June 1-May 31 marketing year.

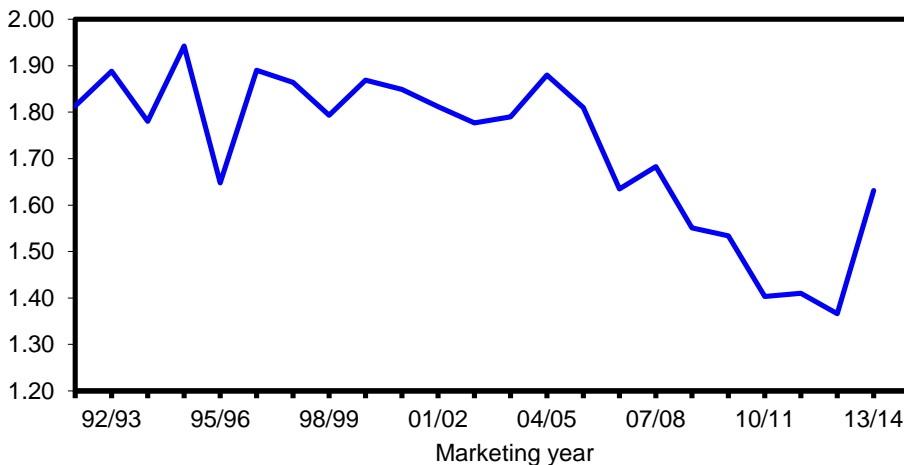
Source: USDA, World Agricultural Outlook Board, World Agricultural Supply and Demand Estimates and supporting materials.

Data run: 5/13/2013

Figure 2

### U.S. feed and residual use of corn, sorghum, barley, oats, and wheat per GCAU

Tons per GCAU



Source: USDA, Economic Research Service, *Feed Grains Database*.

### Other animal units

HPAU are forecast at 144.27 units for 2013/14, an increase of 1.64 from 2012/13, mostly reflecting increases in hogs and broilers (table 3). RCAU at 67.32 units increase by only 0.04 million as higher numbers for other cattle, hogs, and poultry offset declines for other categories. G&RCAUs decline by 0.08 units to 76.20 as hogs and poultry advances offset declines in cattle on feed. Animal unit data are reported in table 3.

Table 3--Indexes of feed consuming animal units (millions)

Unit 1/		2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
Grain	Dairy	10.47	10.55	10.31	10.39	10.48	10.46	10.43
	Cattle on feed	22.72	21.23	20.90	21.47	21.64	20.46	19.15
	Other cattle	3.69	3.66	3.64	3.55	3.43	3.40	3.41
	Hogs	26.29	26.38	25.95	26.12	26.74	27.00	27.38
	Poultry	31.30	30.29	30.16	30.21	29.71	30.00	30.70
	Other livestock	0.63	0.63	0.63	0.63	0.62	0.62	0.62
	Total	95.12	92.75	91.60	92.37	92.64	91.94	91.69
High protein	Dairy	10.71	10.79	10.56	10.63	10.73	10.70	10.68
	Cattle on feed	13.18	12.32	12.13	12.46	12.55	11.87	11.11
	Other cattle	6.36	6.30	6.27	6.12	5.91	5.86	5.88
	Hogs	33.40	33.52	32.96	33.18	33.97	34.29	34.78
	Poultry	82.68	79.74	79.24	79.43	78.63	79.40	81.33
	Other livestock	0.57	0.55	0.54	0.52	0.51	0.51	0.50
	Total	146.90	143.21	141.69	142.34	142.31	142.63	144.27
Roughage	Dairy	13.18	13.26	13.10	13.20	13.32	13.26	13.23
	Cattle on feed	2.35	2.20	2.16	2.22	2.24	2.12	1.98
	Other cattle	49.69	49.24	49.02	47.79	46.21	45.75	45.91
	Hogs	3.38	3.39	3.34	3.36	3.44	3.47	3.52
	Poultry	0.57	0.55	0.54	0.54	0.53	0.54	0.56
	Other livestock	2.30	2.25	2.22	2.20	2.15	2.14	2.12
	Total	71.48	70.89	70.39	69.31	67.89	67.28	67.32
Grain and roughage	Dairy	12.12	12.20	12.01	12.10	12.21	12.16	12.14
	Cattle on feed	10.17	9.51	9.36	9.61	9.69	9.16	8.57
	Other cattle	31.94	31.65	31.51	30.72	29.70	29.40	29.50
	Hogs	12.24	12.29	12.08	12.16	12.45	12.57	12.75
	Poultry	12.04	11.64	11.59	11.61	11.41	11.54	11.81
	Other livestock	1.53	1.50	1.49	1.47	1.45	1.45	1.44
	Total	80.04	78.78	78.03	77.67	76.91	76.28	76.20

1/ Index is based on the dry-weight quantity of feed consumed by the average milk cow during marketing years 1969/70-71/72. Market year is September-August. Latest data may be preliminary or projected.

Source: Calculated by USDA, Economic Research Service from animal inventory numbers published by USDA, National Agricultural Statistics Service in Cattle; Sheep and Goats; Hogs and Pigs; Chickens and Eggs; and Turkeys Raised; and from horse and mule inventory numbers published in the Census of Agriculture.

Date run: 5/13/2013