

**Table 1. Average yields and areas per farm in the US and Holmes County, Ohio, during 1997.**

	US	Holmes Co.
<b>Area</b>	----- ha per farm -----	
Cropland for domestic feed <sup>1</sup>	36	26
Pasture <sup>1,2</sup>	104	13
Cropland-equivalent <sup>3</sup>	50	35
<b>Yield</b>	----- Mg CFU per ha <sup>4</sup> -----	
Average crop yield <sup>5</sup>	5.1 <sup>6</sup>	4.3
Average pasture yield <sup>7</sup>	0.7 <sup>6</sup>	3.0

<sup>1</sup> US, USDA (1999b, 2001); Holmes County, USDA (1999a). Calculated by prorating the land area for each crop according to the weight of its domestic consumption as feed relative to its total production.

<sup>2</sup> Includes private grassland, grazed woodland, and cropland used only for pasture.

<sup>3</sup> US,  $36 + (0.7 \div 5.1) \times 104$ ; Holmes County,  $26 + (3.0 \div 4.3) \times 13$ .

<sup>4</sup> Corn-equivalent feed units (Methods section).

<sup>5</sup> Food grains and feed crops (Bender, 2001).

<sup>6</sup> The ratio of these two values shows that current national average yield is seven times greater on cropland than pasture.

<sup>7</sup> Byerly, 1975; his reported Corn Belt yield was applied to Holmes County.

**Table 2. Energy and protein content of animal products on liveweight basis.**

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<b>Animal product</b>	<b>Energy content (MJ/kg)</b>	<b>Protein content (percent)</b>
Milk	2.8	3.5
Cattle	8.3	8
Pigs	13.8	6
Eggs	6.5	11.5
Broilers	4.6	9

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Byerly (1982).

**Table 3. Consumption of feed and pasture forage for production of animal products and maintenance of breeding animals in 1997.**

<b>Feed and pasture forage</b>	
<b>Animal product</b>	--- kg CFU per kg product <sup>1</sup> ---
Milk	0.76
All cattle	13.3
All pigs	6.4
Eggs	3.9
Broilers	2.6 <sup>2</sup>
<b>Breeding animal<sup>3</sup></b>	--- kg CFU per animal <sup>1</sup> ---
<b>Maintenance<sup>4</sup></b>	
Beef cow	2,500 <sup>5</sup>
Sow	950 <sup>6</sup>
Broiler hen	187
<b>Replacement<sup>8</sup></b>	
Beef cow	5,700 <sup>9</sup>
Sow	770 <sup>10</sup>
Hen	15

USDA (2001), unless noted otherwise.

<sup>1</sup> Corn-equivalent feed units (Methods section).

<sup>2</sup> Includes 0.2 kg CFU from the above feeding rate for egg production, based on national averages for egg and broiler weights and hatch and survival rates (Methods section).

<sup>3</sup> Includes male breeding animals.

<sup>4</sup> Maintenance of dairy cows and egg-laying hens was embedded in feed for milk and egg production (Methods section).

<sup>5</sup> (2,400 kg CFU per cow)(1.05), 1 bull for 20 cows.

<sup>6</sup> (900 kg CFU per sow)(1.05), the former, Crampton and Harris (1969, p. 417) and the latter, 1 boar for 20 sows.

<sup>7</sup> 70 and 30% of the metabolizable energy in feed goes to eggs and maintenance, respectively (Byerly, 1982). Roosters are negligible.

<sup>8</sup> See Methods section for replacement rates and for feed imputed to cattle production for replacement of culled dairy cows.

<sup>9</sup> (2,700 kg CFU per heifer)(2)(1.05), heifers are 2 years old.

<sup>10</sup> (730 kg CFU per gilt)(1.05).

**Table 4. Animal products and breeding populations per farm in the US and Holmes County during 1997.**

	US <sup>1</sup>	Scaled US <sup>2</sup>	Holmes Co. <sup>3</sup>
	----- Number per farm -----		
<b>Animal product</b>			
Milk (1,000 liters)	31.0	21.7	64.3
Calves	0.5	0.4	10.3
Older cattle	15.4	10.8	7.6
Feeder pigs	0	0	33
Older pigs	42	29	46
Eggs (1,000) <sup>4</sup>	30.6	21.4	27.3
Broilers (1,000)	3.5	2.5	9.2
<b>Breeding population</b>			
Dairy cows <sup>5</sup>			
Beef cows <sup>5</sup>	15.7	11.0	3.0
Sows	2.6	1.8	4.0
Hens (eggs) <sup>6</sup>	121	85	107
Hens (broilers) <sup>6</sup>	18	13	48

<sup>1</sup> Animal numbers and 2.2 million farms, USDA (2001).

<sup>2</sup> This is the first column scaled down by a factor of 50ha-35ha, or 1.43, to give the same cropland-equivalent area per farm devoted to domestic feed as in Holmes County, namely 35 ha (Table 1).

<sup>3</sup> Animal numbers and 1,404 farms, USDA (1999a).

<sup>4</sup> Reduced for the number of eggs devoted to broiler production (Methods section).

<sup>5</sup> Includes heifers, 2 years and older.

<sup>6</sup> Includes pullets. Hen flocks apportioned according to production of egg-type eggs and broiler-type eggs (Methods section).

**Table 5. Liveweight of animal products per farm in the US and Holmes County during 1997.**

<b>Animal product</b>	<b>US<sup>1</sup></b>	<b>Scaled US<sup>2</sup></b>	<b>Holmes Co.<sup>3</sup></b>
	----- Mg per farm -----		
Milk	31.9	22.3	66.4 <sup>4</sup>
Calves	0.08	0.06	1.6
Older cattle	8.6	5.8	4.1
Feeder pigs	0	0	1.0
Older pigs	5.0	3.5	5.6
Eggs	1.8	1.3	1.6
Broilers	7.8	5.4	20.3

<sup>1</sup> Reported by USDA (2001).

<sup>2</sup> Footnote 2 in Table 4.

<sup>3</sup> Except for milk, calculations based on USDA data (Methods section).

<sup>4</sup> Reported by ODA (1998).

**Table 6. Amount of energy and protein in animal products per farm in the US and Holmes County during 1997 (Tables 2 and 5).**

Animal Product	Energy		Protein	
	Scaled US	Holmes Co.	Scaled US	Holmes Co.
	---- GJ per farm ----		---- Mg per farm ----	
Milk	62	186	0.78	2.30
Cattle	49	47	0.47	0.46
Pigs	48	91	0.21	0.40
Eggs	9	10	0.15	0.18
Broilers	25	93	0.49	1.80
Total	193	427	2.10	5.14

**Table 7. Combined consumption of feed and pasture forage for animal production and breeding populations per farm in the US and Holmes County during 1997 (Tables 3, 4, and 5)**

	Scaled US	Holmes Co.
	---- Mg CFU per farm <sup>1</sup> ----	
<b>Animal product</b>		
Milk	17	50
Cattle	78	76
Imported calves	---	10 <sup>2</sup>
Pigs	22	42
Imported feeder pigs	---	1.7 <sup>2</sup>
Eggs	5.1	6.2
Broilers	14	53 <sup>3</sup>
Subtotal (rounded)	136	239
<b>Breeding population</b>		
Maintenance <sup>4</sup>		
Beef cows		
Sows	1.7	3.8
Broiler hens	0.2	0.9
Replacement <sup>5</sup>		
Beef cows	12.5	3.4
Sows	0.5	1.0
Layer hens	1.3	1.6
Broiler hens	0.2	0.7
Subtotal (rounded)	44	19
<b>Total</b>	<b>180</b>	<b>258</b>

<sup>1</sup> Corn-equivalent feed units (Methods section).

<sup>2</sup> (750)(13.3x10<sup>-3</sup>) and (270)(6.4x10<sup>-3</sup>), respectively. Factors are imported liveweight in kg (Results section) and feed consumption factor in Mg CFU (Table 3).

<sup>3</sup> Includes feed for imported broiler chicks by means of feed consumption factor (Table 3).

<sup>4</sup> Maintenance of dairy cows and egg-laying hens was embedded in feed for milk and egg production (Methods section).

<sup>5</sup> Feed was charged to cattle production for replacement of culled dairy cows (Methods section).

**Table 8. Separate consumption of feed and pasture forage for animal production and breeding populations per farm in the US and Holmes County during 1997 (Table 7).**

<b>Production and breeding population</b>	<b>Scaled US</b>	<b>Holmes Co.</b>
	--- Mg CFU per farm <sup>1</sup> ---	
<b>Feed</b>		
Milk	15	45
Cattle	47	39
Pigs	24	49
Eggs	6	8
Broilers	14	55
Subtotal	106	196
<b>Pasture forage</b>		
Milk	2	5
Cattle	71	58
Subtotal	73	63
<b>Total</b>	<b>179</b>	<b>259</b>

For the partition between feed and pasture forage, see Methods section.

<sup>1</sup> Corn-equivalent feed units (Methods section).



**Table 9. Energy and protein conversion efficiencies between animal production and consumption of feed and pasture forage in the US and Holmes County during 1997 (Tables 6 and 7).**

**Animal product**

	Energy				Protein			
	Production alone <sup>1</sup>		Production and breeding		Production alone <sup>1</sup>		Production and breeding	
	Scaled US	Holmes County	Scaled US	Holmes County	Scaled US	Holmes County	Scaled US	Holmes County
	----- percent -----							
Milk	23	23	23 <sup>2</sup>	23 <sup>2</sup>	50	50	50 <sup>2</sup>	50 <sup>2</sup>
Cattle	3.9	3.4	2.6	3.0	6.6	5.8	4.3	5.2
Cattle, feed only <sup>3</sup>	10	8.6	6.5	7.6	17	15	11	13
Pigs	14	13	12	12	10	10	9.5	9.3
Eggs	10	10	8.8	8.1	31	31	25	25
Broilers	11	11	11	11	38	38	37	36
Five products	8.9	11	6.7	10	17	23	13	22

Data in Table 7 were converted into energy and protein (Methods section).

<sup>1</sup> For milk, eggs, and broilers, efficiencies were mathematically the same between US and Holmes County, but for cattle and pigs, they were different because of imported animals in Holmes County (Results section).

<sup>2</sup> For dairy cows, maintenance was embedded in milk production, and replacement was charged to cattle production (Methods section).

<sup>3</sup> Assumed that the national 40 and 60% respective proportion of feed and pasture forage in beef cattle diet also applied to Holmes County (Methods section). Since feed is only 40% of total consumption and since all production from feed and pasture forage is still counted (Table 6), these percentages are  $1 \div 0.40$ , or 2.5 times greater (within rounding error) than the above respective percentages for cattle on feed and pasture forage.