Distribution of Animals Used for Agriculture and Manure Generated: Ratio of Manure to Land Application

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Report Preamble

The present document is meant to highlight the findings of the Humane Party in its analysis of the number of animals kept by state, the amount of manure generated by them and the implications of such manure. The present report analyses the data to understand which species are being most exploited and the concentrations by state. The report also analyses the amount of manure generated by state and its ratio to land mass of each state in relation to the annual recommended application (RA) for fertilization of crops.

Bias

There is an ethical obligation to disclose the bias of the preparers and analyzers involved in this report. The Humane Party aims and fights to free all animals from abuse, exploitation, and property status. It is in the Humane Party's interest that the results of this report support its goal insofar as possible. All members involved in this investigation, analysis, and report have acted at the margins of this bias, striving for their judgement to remain unaffected by said bias.

Sources

The sources used for this publication include data from the USDA National Agriculture Statistics Service and USDA Economic Research Service, animal agriculture industries, academic journal articles, and university/extension literature.

Keywords

Environmental+science, science, health, animal+welfare, USDA, farm, farming.

Disclaimer & Purpose

Disclaimer

For the purposes of this report, the most representative species being used for farming were analyzed. The species represented in this report are:

- Chickens (farmed for their meat)
- Laying hens
- Turkeys
- Pigs & hogs
- Cows and calves
- Cows (farmed for their milk)

The categories are as shown above to parallel the documents kept by the United States Department of Agriculture (U.S.D.A.)

For the purposes of the present report the following unincorporated territories and other forms of U.S. territories were not included:

- District of Columbia
- Puerto Rico
- American Samoa
- Guam
- Northern Mariana Islands
- U.S. Virgin Islands
- Other 5 island areas

The present report contains differences when compared to previous reports generated by the Economic Transition Team (E.T.T.); most noticeably in the mass of land. The difference answers to a different set of categories utilized for the present report to ensure the highest level of accuracy in the results. The E.T.T. uses the most representative data available based on the scope and particularities of each report; as such, the E.T.T. will always declare such variances in the disclaimers. The Economic Transition Team and the Humane Party always strive for transparency and objectivity when reporting our findings.

Many states choose to disclose the number of animals kept as a combined number in order “to avoid disclosing individual operations” (USDA National Agriculture Statistics Service 2016). Therefore, there is no accurate way to identify the number of animals kept by those states. In such instances, the number assigned to each state has been zero in order to ensure that the data generated by states is on the lowest end of the spectrum rather than unwillingly inflated.

Purpose

The purpose of the present document is to understand the daily generation of animal manure due to animal agriculture and its implications. Recommended rates of manure application to farmlands are taken into account along with each state's total land and farming-allocated land to evaluate whether the amount of manure generated per state is insufficient, sufficient or excessive to meet the fertilization needs of each state.

This analysis is meant to provide relevant information in a simplified manner for internal and external parties interested in the subject as well as for all stakeholders.

Conclusions

After reviewing the data for the entire continental U.S. it is concluded that the number of animals being farmed generates an excessive amount of manure that exceeds the fertilization needs of crop and grazing land by alarming rates. Every state exceeded the recommended amount of manure that could be safely applied to their farmlands with manure locally generated. Alaska is the state that least exceeds this amount and yet it generates 10 times more in a year than could be safely applied to its crop and grazing lands. The economic, environmental and health implications of such excessive amounts of manure can be potentially devastating. Further research is necessary to understand the uses and measures undertaken to handle the excess manure as well as to assess the present and future effects of the excess manure on local communities and at a national and international levels.

Even though this report centers around the manure generated by animals being farmed, manure is only a symptom of the real problem. The underlying problem is the number of animals being farmed for human consumption, which is generating a waste that cannot be effectively used or safely disposed.

Contents

Findings

Relating to farmed animals

In the entire continental U.S., over 9 billion animals are kept for farming purposes within a year [USDA National Agriculture Statistics Service, 2012]. The percentual representation of animals is as follows [rounding difference equals .01%]:

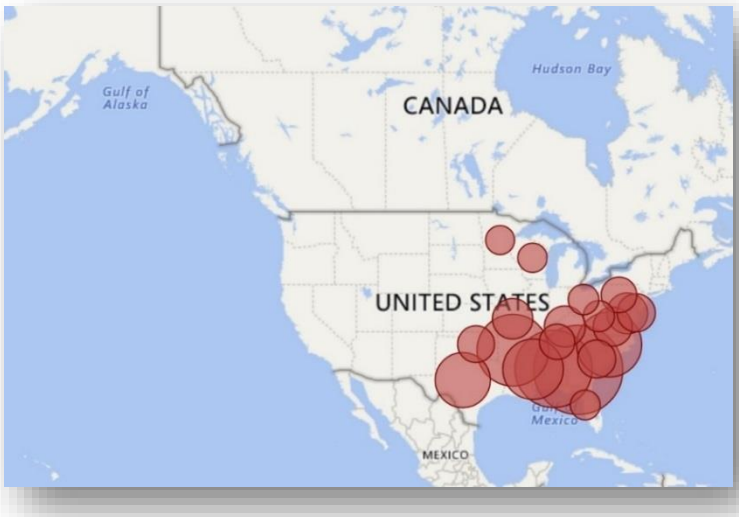
- Of the total number of animals being kept for farming purposes, chickens account for 8.126 billion, roughly 90.06% of the total.
- Of the total number of animals being kept for farming purposes, laying hens account for 441 million, roughly 4.89% of the total.
- Of the total number of animals being kept for farming purposes, turkeys account for 203.2 million, roughly 2.25%% of the total.
- Of the total number of animals being kept for farming purposes, pigs & hogs account for 159.49 million, roughly 1.77%% of the total.
- Of the total number of animals being kept for farming purposes, cows & calves account for 84.87 million, roughly 0.94%% of the total.
- Of the total number of animals being kept for farming purposes, cows for milk account for 8.7 million, roughly 0.1%% of the total.

Exhibits 1 & 1.2 show the concentration of each species per state. Close examination of *Exhibits 1 & 1.2* bring out the following findings:

- All states keep cows & calves.
- Chickens farmed for their meat are concentrated in the eastern territory. *Figure 1* illustrates the concentration[1]:

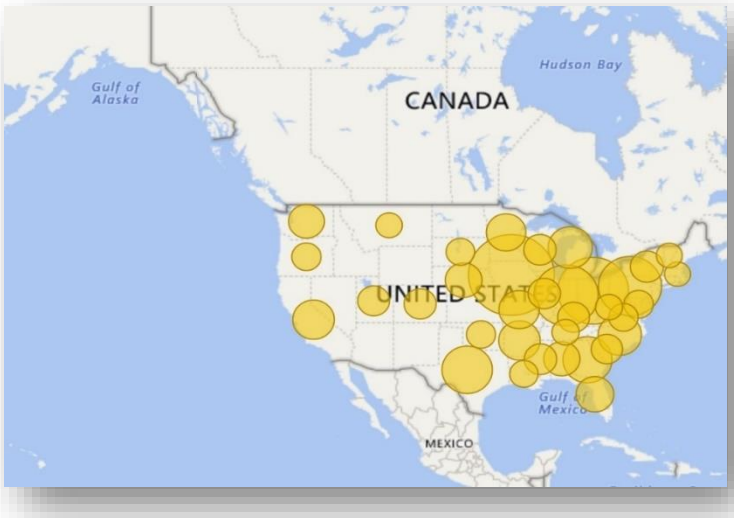
[1] California, Illinois, Indiana, Iowa, Louisiana, Michigan, Nebraska, New York, Oregon, and Washington combined to avoid disclosing individual operations (USDA National Agriculture Statistics Service 2016). As such, it is not possible to add their individual amounts; yet, their total numbers represent 6% of the total number of animals being kept for farming purposes.

Figure 1 Farmed chickens concentration



- States with the largest concentrations of chickens are Georgia (1,339,600,000), Alabama (1,082,900,00) and Arkansas (962,000,000). These 3 states keep 41.65% of all chickens useed for their meat in the U.S. territory.
- Most laying hens are clustered within the eastern territory. *Figure 2* illustrates this concentration:

Figure 1 Laying hens concentration



- States with the largest concentrations of laying hens are Iowa (59,630,000), Ohio (44,570,00) and Indiana (38,300,000). These 3 states keep 32.31% of all laying hen used for farming in the U.S. territory.
- States with the largest concentrations of turkeys are Minnesota (41,000,000), North Carolina (31,000,00) and Arkansas (27,500,000). These 3 states keep 48.97% of all turkeys used for farming in the U.S. territory.

- States with the largest concentrations of pigs and hogs are Iowa (46,616,000), Minnesota (19,233,00) and North Carolina (16,346,000). These 3 states keep 39.48% of all pigs and hogs used for farming in the U.S. territory.
- All states keep cows & calves.
- States with the largest concentrations of cows and calves are Texas (11,793,000), Nebraska (6,450,00) and Kansas (6,248,000). These 3 states keep 28.86% of all cows and calves used for farming in the U.S. territory.
- States with the largest concentrations of cows for milk are California (1,755,000), Wisconsin (1,280,00) and New York (622,000). These 3 states keep 41.99% of all cows farmed for milk in the U.S. territory.
- In total, the top 5 states keeping animals are Georgia (1,364,499,000), Alabama (1,094,982,000), Arkansas (1,008,201,000), North Carolina (888,385,000) and Mississippi (731,279,000). The top 3 states are keeping 38.43% of all the animals used for farming purposes in the U.S. territory; the top 5 states are keeping 56.38% of all the animals used for farming purposes in the U.S. territory.

Relating to land mass used for farming

Exhibits 2 & 2.2 show that the states with the largest extensions of land dedicated to farming in general are Texas (167,188,000 acres), Missouri (43,995,000 acres), Illinois (35,532,000 acres), Arizona (72,700,000 acres) and Minnesota (50,961,000 acres). The top 3 states with the largest farm extension represent 20.27% of the entire mass of land dedicated to farming in the U.S. territory; the top 5 states with the largest farm extension represent 25.99% of the entire mass of land dedicated to farming in the U.S. territory (USDA National Agriculture Statistics Service).

Exhibits 2 & 2.2 also show that the states with the most allocated land for farming in relation to their entire land mass (no water bodies included) are Nebraska (92.2%), South Dakota (89.15%), North Dakota (88.91%), Kansas (88.17%) and Iowa (85.66%). These 5 states have more than 85% of their entire land mass dedicated solely to farming. Such farming land includes both animal- and plant-based farming.

Relating to manure generated by farmed animals

The following bullet points show the amount of manure generated by animal (Midwest Plan Service; Beef USA; Cobb500; Poultry Keeper; Penn State Extension):

- Chickens generate an average of 0.298 pounds of manure a day per individual.
- Laying hens generate an average of 0.275 pounds of manure a day per individual.
- Turkeys generate an average of 0.555 pounds of manure a day per individual.
- Pigs & hogs generate an average of 6.9 pounds of manure a day per individual.

- Cows & calves generate an average of 45.125 pounds of manure a day per individual.
- Cows for milk generate an average of 133 pounds of manure a day per individual.

Exhibits 3 & 3.2 factor those averages by multiplying them for the number of each species kept by state, providing the following totals:

- The amount of manure generated in the entire U.S. is 8.74 billion pounds per day, a grand total of 3.19 trillion pounds per year.
- Chickens generate a total of 2.42 billion pounds of manure daily. Manure from chickens accounts for 27.69% of the total amount of manure generated in the entire U.S.
- Laying hens generate a total of 121.28 million pounds of manure daily. Manure from laying hens accounts for 1.39% of the total amount of manure generated in the entire U.S.
- Turkeys generate a total of 112.78 million pounds of manure daily. Manure from turkeys accounts for 1.39% of the total amount of manure generated in the entire U.S.
- Pigs & hogs generate a total of 1.1 billion pounds of manure daily. Manure from pigs and hogs accounts for 1.39% of the total amount of manure generated in the entire U.S.
- Cows & calves generate a total of 3.83 billion pounds of manure daily. Manure from cows and calves accounts for 43.80% of the total amount of manure generated in the entire U.S.
- Cows for milk generate a total of 1.16 billion pounds of manure daily. Manure from cows for milk accounts for 13.25% of the total amount of manure generated in the entire U.S.

Manure recommended application (R.A.) for land fertilization

Animal manure contains nutrients such as nitrogen and phosphorus that are essential for plant growth (Brady and Weil 2008). However, only so much of these nutrients can be held by soil particles or absorbed by plant roots. For pasturelands, this is 75 pounds per acre for nitrogen and 30 pounds per acre for phosphorus (Kellog et al. 2000). For croplands, this amount depends on the nutrient uptake of the crops. Excessive nutrients that are added to land, but cannot be absorbed by plants or held by soil particles, can run off the land and into waterways, leach into groundwater, and enter into the air (Driscoll et al. 2003). In order to maximize the efficiency of crops and soil while protecting waterways, recommended amounts of manure have been calculated based on soil characteristics and other variables for farmers. However, these amounts tend to be very specific and have many variables. Out of the analyzed R.A., one was found that was designed for farmers in the entire state of Wisconsin. The authors of these recommendations have been contacted to try to come up with a more general recommendation for all of the U.S. However, at this point, their data is the most general and,

therefore, will be used as the baseline for this report. The data as such has limitations but given its state-wide characteristic it becomes the best data available. “Guidelines for Applying Manure to Cropland and Pasture in Wisconsin” by Madison et al. suggests rates of manure to be applied to crops based on the nutrients present in the manure from each species of animal, using solid manure from cows as a baseline. Madison et al. suggest applying no more than 25 tons of solid manure from cows used for milk per acre based on its nutritional content in order to avoid leaching excess nutrients. Recommended application amounts for other species’ manure are derived when comparing their nutritional content with that of solid manure from cows used for milk. While the recommended amount in the mentioned paper targets solely the state of Wisconsin, the suggested rates can be applied to the entire country to obtain a rough estimate of how much manure could be applied to farmland based on a recommended application rate.

The recommended application rate per acre per species is as follows:

- 5 tons of solid poultry manure per acre.
- 25 tons of solid swine manure per acre.
- 14 tons of solid beef cow and calf manure per acre.
- 25 tons of solid milk cow manure per acre.

Ratio of manure generated per state to each state’s land mass

Based on previous data we have the number of animals kept by each state for farming purposes and, with the amount of manure generated per species, we can obtain the amount of manure each state generates. In addition to these numbers *Exhibits 3 & 3.2* show the amount of manure generated per state on a daily basis. By introducing the recommended amount (R.A.) and by using the following equation, we can obtain the ratio of times of the recommended amount generated per state to cover both its entire mass of land and its specific fertilizer applicable farming land (F.A.F.L):

$$\delta RA = \frac{\sum \left(\frac{\omega_{n1}}{RA_{n1}} + \frac{\omega_{n2}}{RA_{n2}} + \cdots + \frac{\omega_{nt}}{RA_{nt}} \right)}{\varphi}$$

Where:

δRA= Times of R.A.
ω= Lbs. of manure
n= Species
RA= Recommended amount
φ= Mass of land

This equation to calculate the time of recommended amount, based on the previous data, gives a daily factor. In order to obtain the annual times of R.A. → annual δRA = δRA* 365.

For mass of land the values utilized were both the total land mass extension of each state, for illustrative purposes, and the land mass allocated per state for farming purposes. Most recent reports show that 914.5 million acres across the continental U.S. are used for farming purposes, a decline of 0.8% in comparison with 2007. Of the 914.5 million acres: 45% are dedicated to permanent pasture, 42.6% are dedicated to cropland of which 94% are harvested, 8% are dedicated to woodland and the remaining 3.6% was land in farmsteads, buildings, livestock facilities, etc. (USDA National Agriculture Statistics Service). For the purposes of this section, only a part of the allocated farming land per state was utilized as not all farming land requires the use of fertilizers; such land will be hereafter defined as "Fertilizer-Applicable Farming Land" (F.A.F.L.). Only the following farming land extensions were taken into account for the fertilizer-applicable farming land:

- Harvested cropland.
- Woodland pastured.
- Other pasture and grazing land that could have been used for crops without additional improvements.
- Permanent pasture and rangeland, other than cropland and woodland pastured.

Exhibits 4 & 4.2 show each state's total land mass and farmland allocated for animal-based agricultural purposes.

By analyzing the amount of manure generated per state and putting it into context with the land mass of each state and their allocated F.A.F.L. we obtain the times we can cover each state's total land mass and F.A.F.L. shown in *Exhibits 5 & 5.2*. Some of the most relevant findings include the following:

- The top 5 states generating manure are Texas (805,447,000 lbs/day), Iowa (535,811,000 lbs/day), Georgia (459,908,000 lbs/day), North Carolina (417,426,000 lbs/day) and California (398,750,000 lbs/day). The top 3 states generate in aggregate 20.60% of the entire manure generated in the U.S. territory and the top 5 states generate 29.93% of all the manure generated in the U.S. territory.
- The entire farming industry generates enough manure in 5 days to cover the entire continental U.S. land territory with the annual recommended amount for farm land.
- The entire farming industry generates enough manure in 1 day to cover almost 60% of the entire fertilizer-applicable farming land in the continental U.S with the annual recommended amount for farm land.

- The entire animal farming system generates enough manure annually to cover the entire extension of the continental U.S. 72 times with the recommended annual amount.
- The entire animal farming system generates enough manure annually to cover the entire fertilizer-applicable farming land extension of the continental U.S. 212 times with the recommended annual amount.
- The 3 states generating more manure in relationship to their state's entire land mass extension (including urban areas) are:
    - Delaware, generating enough manure to fill its entire state's land mass with the recommended annual amount almost 6 times daily (almost 2,138 time annually). It generates enough manure to cover fertilizer-applicable farming land with the recommended annual amount over 16 times daily (over 6,083 times annually).
    - Maryland, generating enough manure to fill its entire state's land mass with the recommended annual amount 1.5 times daily (almost 555 time annually). It generates enough manure to cover its entire fertilizer-applicable farming land with the recommended annual amount over 6 times daily (over 2,326 times annually).
    - Georgia, generating enough manure to fill its entire state's land mass with the recommended annual amount a little over 1 time daily (over 420 times annually). It generates enough manure to cover its entire fertilizer-applicable farming land with the recommended annual amount almost 8 times daily (over 2,823 times annually).
- The 3 states generating more manure in relation to their state's entire fertilizer-applicable farming land extension are:
    - Delaware, generating enough manure to cover its fertilizer-applicable farming land with the recommended annual amount more than 16 and a half times daily (over 6,083 times annually).
    - Georgia, generating enough manure to cover its entire fertilizer-applicable farming land with the recommended annual amount almost 8 times daily (over 2,823 times annually).
    - Alabama, generating enough manure to cover its entire fertilizer-applicable farming land with the recommended annual amount almost 7 times daily (over 2,492 times annually).

Exhibits

Exhibit 1 No. of animals per state

NUMBER OF ANIMALS RAISED (x1000)								
State	**Chicken**	**Laying hen**	**Turkeys**	**Pigs and Hogs**	**Cow/calves**	**Cows for milk**		**Total**
Alabama	1,082,900	10,455	-	327	1,300	-		1,094,982
Alaska	-	-	-	3	13	-		16
Arizona	-	-	-	271	772	198		1,241
Arkansas	962,000	15,675	27,500	1,276	1,750	-		1,008,201
California	-	15,803	11,500	204	3,395	1,755		32,657
Colorado	-	6,329	-	2,921	2,692	158		12,100
Connecticut	-	-	-	-	48	-		48
Delaware	244,300	-	-	-	16	-		244,316
Florida	65,100	11,785	-	31	1,577	123		78,616
Georgia	1,339,600	23,116	-	683	1,100	-		1,364,499
Hawaii	-	-	-	19	142	-		161
Idaho	-	-	-	-	1,752	598		2,350
Illinois	-	6,490	-	11,462	1,127	93		19,172
Indiana	-	38,300	19,300	8,867	704	186		67,357
Iowa	-	59,630	9,100	46,616	3,634	216		119,196
Kansas	-	-	-	3,264	6,248	152		9,664
Kentucky	307,700	6,122	-	737	2,160	-		316,719
Louisiana	-	2,684	-	8	780	-		3,472
Maine	-	-	-	-	84	-		84
Maryland	303,500	3,700	-	-	186	-		307,386

Exhibit 1.2 No. of animals per state [continuation]

NUMBER OF ANIMALS RAISED (x1000)								
State	**Chicken**	**Laying hen**	**Turkeys**	**Pigs and Hogs**	**Cow/calves**	**Cows for milk**		**Total**
Massachusetts	-	214	-	-	38	-		252
Michigan	-	18,396	5,200	2,424	755	425		27,200
Minnesota	46,400	13,755	41,000	19,233	1,941	459		122,788
Mississippi	722,500	6,725	-	1,164	890	-		731,279
Missouri	294,600	14,624	19,000	8,982	4,350	-		341,556
Montana	-	680	-	480	2,650	-		3,810
Nebraska	-	10,960	-	7,651	6,450	-		25,061
Nevada	-	-	-	6	445	-		451
New Hampshire	-	-	-	-	35	-		35
New Jersey	-	-	-	12	28	-		40
New Mexico	-	-	-	3	1,103	327		1,433
New York	-	7,288	-	156	868	622		8,934
North Carolina	822,700	17,509	31,000	16,346	830	-		888,385
North Dakota	-	-	-	860	1,810	-		2,670
Ohio	80,400	44,570	5,200	4,250	1,038	262		135,720
Oklahoma	217,000	3,345	-	8,515	5,000	-		233,860
Oregon	-	3,498	-	14	1,196	124		4,832
Pennsylvania	190,400	37,084	6,500	2,126	1,095	525		237,730
Rhode Island	-	-	-	-	5	-		5
South Carolina	242,600	5,567	-	279	340	-		248,786
South Dakota	-	2,892	4,300	4,257	3,733	117		15,299
Tennessee	185,200	1,498	-	453	1,830	-		188,981
Texas	608,700	24,478	-	2,570	11,793	507		648,048
Utah	-	5,991	3,600	1,256	728	92		11,667
Vermont	-	184	-	-	131	129		444
Virginia	262,800	3,598	17,000	324	1,433	87		285,242
Washington	-	10,024	-	-	876	274		11,174
West Virginia	93,700	1,336	3,000	4	405	-		98,445
Wisconsin	53,900	6,729	-	787	2,270	1,280		64,966
Wyoming	-	-	-	651	1,330	-		1,981
Total	8,126,000	441,034	203,200	159,492	84,876	8,709		**9,023,311**

Exhibit 2 Land mass distribution

MASS OF LAND UTILIZED (x1000)				
State		**Total**	**Total Farming**	**% Factor**
Alabama		32,413	8,902	27.46%
Alaska		365,210	833	0.23%
Arizona		72,700	26,249	36.11%
Arkansas		33,302	13,810	41.47%
California		99,699	25,569	25.65%
Colorado		66,331	31,886	48.07%
Connecticut		3,099	436	14.07%
Delaware		1,247	508	40.73%
Florida		34,320	9,548	27.82%
Georgia		36,808	9,620	26.14%
Hawaii		4,111	1,129	27.46%
Idaho		52,892	11,760	22.23%
Illinois		35,532	26,937	75.81%
Indiana		22,929	14,720	64.20%
Iowa		35,748	30,622	85.66%
Kansas		52,326	46,137	88.17%
Kentucky		25,271	13,049	51.64%
Louisiana		27,651	7,900	28.57%
Maine		19,740	1,454	7.37%
Maryland		6,212	2,030	32.68%
Massachusetts		4,992	523	10.48%
Michigan		36,185	9,948	27.49%
Minnesota		50,961	26,035	51.09%
Mississippi		30,031	10,931	36.40%

Exhibit 2.2 Land mass distribution [continuation]

MASS OF LAND UTILIZED (x1000)				
State		**Total**	**Total Farming**	**% Factor**
Missouri		43,995	28,266	64.25%
Montana		93,149	59,758	64.15%
Nebraska		49,167	45,331	92.20%
Nevada		70,260	5,913	8.42%
New Hampshire		5,730	474	8.27%
New Jersey		4,707	715	15.19%
New Mexico		77,631	43,201	55.65%
New York		30,161	7,183	23.82%
North Carolina		31,116	8,414	27.04%
North Dakota		44,161	39,262	88.91%
Ohio		26,151	13,960	53.38%
Oklahoma		43,901	34,356	78.26%
Oregon		61,432	16,301	26.53%
Pennsylvania		28,636	7,704	26.90%
Rhode Island		662	69	10.43%
South Carolina		19,239	4,971	25.84%
South Dakota		48,519	43,257	89.15%
Tennessee		26,390	10,867	41.18%
Texas		167,188	130,153	77.85%
Utah		52,589	10,974	20.87%
Vermont		5,899	1,251	21.21%
Virginia		25,274	8,302	32.85%
Washington		42,532	14,748	34.68%
West Virginia		15,384	3,606	23.44%
Wisconsin		34,661	14,568	42.03%
Wyoming		62,140	30,363	48.86%
Total / Median		**2,260,381**	**914,503**	**32.76%**

Exhibit 3 Manure generated per state

LBS OF MANURE GENERATED/DAY(x1000)								
State	**Chicken**	**Laying hen**	**Turkeys**	**Pigs and Hogs**	**Cow/calves**	**Cows for milk**		**Total**
Alabama	322,704.20	2,875.13	-	2,256.30	58,662.50	-		386,498.13
Alaska	-	-	-	20.70	586.63	-		607.33
Arizona	-	-	-	1,869.90	34,836.50	26,334.00		63,040.40
Arkansas	286,676.00	4,310.63	15,262.50	8,804.40	78,968.75	-		394,022.28
California	-	4,345.83	6,382.50	1,407.60	153,199.38	233,415.00		398,750.30
Colorado	-	1,740.48	-	20,154.90	121,476.50	21,014.00		164,385.88
Connecticut	-	-	-	-	2,166.00	-		2,166.00
Delaware	72,801.40	-	-	-	722.00	-		73,523.40
Florida	19,399.80	3,240.88	-	213.90	71,162.13	16,359.00		110,375.70
Georgia	399,200.80	6,356.90	-	4,712.70	49,637.50	-		459,907.90
Hawaii	-	-	-	131.10	6,407.75	-		6,538.85
Idaho	-	-	-	-	79,059.00	79,534.00		158,593.00
Illinois	-	1,784.75	-	79,087.80	50,855.88	12,369.00		144,097.43
Indiana	-	10,532.50	10,711.50	61,182.30	31,768.00	24,738.00		138,932.30
Iowa	-	16,398.25	5,050.50	321,650.40	163,984.25	28,728.00		535,811.40
Kansas	-	-	-	22,521.60	281,941.00	20,216.00		324,678.60
Kentucky	91,694.60	1,683.55	-	5,085.30	97,470.00	-		195,933.45
Louisiana	-	738.10	-	55.20	35,197.50	-		35,990.80
Maine	-	-	-	-	3,790.50	-		3,790.50
Maryland	90,443.00	1,017.50	-	-	8,393.25	-		99,853.75
Massachusetts	-	58.85	-	-	1,714.75	-		1,773.60
Michigan	-	5,058.90	2,886.00	16,725.60	34,069.38	56,525.00		115,264.88
Minnesota	13,827.20	3,782.63	22,755.00	132,707.70	87,587.63	61,047.00		321,707.15
Mississippi	215,305.00	1,849.38	-	8,031.60	40,161.25	-		265,347.23
Missouri	87,790.80	4,021.60	10,545.00	61,975.80	196,293.75	-		360,626.95

Exhibit 3.2 Manure generated per state [continuation]

LBS OF MANURE GENERATED/DAY(x1000)								
State	**Chicken**	**Laying hen**	**Turkeys**	**Pigs and Hogs**	**Cow/calves**	**Cows for milk**		**Total**
Montana	-	187.00	-	3,312.00	119,581.25	-		123,080.25
Nebraska	-	3,014.00	-	52,791.90	291,056.25	-		346,862.15
Nevada	-	-	-	41.40	20,080.63	-		20,122.03
New Hampshire	-	-	-	-	1,579.38	-		1,579.38
New Jersey	-	-	-	82.80	1,263.50	-		1,346.30
New Mexico	-	-	-	20.70	49,772.88	43,491.00		93,284.58
New York	-	2,004.20	-	1,076.40	39,168.50	82,726.00		124,975.10
North Carolina	245,164.60	4,814.98	17,205.00	112,787.40	37,453.75	-		417,425.73
North Dakota	-	-	-	5,934.00	81,676.25	-		87,610.25
Ohio	23,959.20	12,256.75	2,886.00	29,325.00	46,839.75	34,846.00		150,112.70
Oklahoma	64,666.00	919.88	-	58,753.50	225,625.00	-		349,964.38
Oregon	-	961.95	-	96.60	53,969.50	16,492.00		71,520.05
Pennsylvania	56,739.20	10,198.10	3,607.50	14,669.40	49,411.88	69,825.00		204,451.08
Rhode Island	-	-	-	-	225.63	-		225.63
South Carolina	72,294.80	1,530.93	-	1,925.10	15,342.50	-		91,093.33
South Dakota	-	795.30	2,386.50	29,373.30	168,451.63	15,561.00		216,567.73
Tennessee	55,189.60	411.95	-	3,125.70	82,578.75	-		141,306.00
Texas	181,392.60	6,731.45	-	17,733.00	532,159.13	67,431.00		805,447.18
Utah	-	1,647.53	1,998.00	8,666.40	32,851.00	12,236.00		57,398.93
Vermont	-	50.60	-	-	5,911.38	17,157.00		23,118.98
Virginia	78,314.40	989.45	9,435.00	2,235.60	64,664.13	11,571.00		167,209.58
Washington	-	2,756.60	-	-	39,529.50	36,442.00		78,728.10
West Virginia	27,922.60	367.40	1,665.00	27.60	18,275.63	-		48,258.23
Wisconsin	16,062.20	1,850.48	-	5,430.30	102,433.75	170,240.00		296,016.73
Wyoming	-	-	-	4,491.90	60,016.25	-		64,508.15
Total	2,421,548.00	121,284.35	112,776.00	1,100,494.80	3,830,029.50	1,158,297.00		**8,744,429.65**

Exhibit 4 Land mass distribution with F.A.F.L.

MASS OF LAND UTILIZED (x1000)				
State		**Total**	**Farming**	**% Factor**
Alabama		32,413	5,081	15.68%
Alaska		365,210	738	0.20%
Arizona		72,700	24,050	33.08%
Arkansas		33,302	11,363	34.12%
California		99,699	22,391	22.46%
Colorado		66,331	25,661	38.69%
Connecticut		3,099	199	6.42%
Delaware		1,247	438	35.14%
Florida		34,320	7,580	22.09%
Georgia		36,808	5,484	14.90%
Hawaii		4,111	900	21.90%
Idaho		52,892	9,879	18.68%
Illinois		35,532	23,542	66.26%
Indiana		22,929	12,909	56.30%
Iowa		35,748	26,985	75.49%
Kansas		52,326	37,320	71.32%
Kentucky		25,271	9,564	37.84%
Louisiana		27,651	5,629	20.36%
Maine		19,740	520	2.63%
Maryland		6,212	1,482	23.86%
Massachusetts		4,992	223	4.46%
Michigan		36,185	7,678	21.22%
Minnesota		50,961	21,685	42.55%
Mississippi		30,031	6,675	22.23%

Exhibit 4.2 Land mass distribution with F.A.F.L. [continuation]

MASS OF LAND UTILIZED (x1000)				
State		**Total**	**Farming**	**% Factor**
Missouri		43,995	22,290	50.67%
Montana		93,149	51,701	55.50%
Nebraska		49,167	41,645	84.70%
Nevada		70,260	5,366	7.64%
New Hampshire		5,730	134	2.34%
New Jersey		4,707	501	10.65%
New Mexico		77,631	41,057	52.89%
New York		30,161	4,769	15.81%
North Carolina		31,116	5,795	18.62%
North Dakota		44,161	34,164	77.36%
Ohio		26,151	11,549	44.16%
Oklahoma		43,901	30,260	68.93%
Oregon		61,432	13,791	22.45%
Pennsylvania		28,636	5,024	17.55%
Rhode Island		662	29	4.39%
South Carolina		19,239	2,507	13.03%
South Dakota		48,519	39,637	81.69%
Tennessee		26,390	8,606	32.61%
Texas		167,188	115,351	68.99%
Utah		52,589	10,086	19.18%
Vermont		5,899	641	10.87%
Virginia		25,274	5,666	22.42%
Washington		42,532	10,128	23.81%
West Virginia		15,384	2,295	14.92%
Wisconsin		34,661	10,818	31.21%
Wyoming		62,140	29,288	47.13%
Total / Median		**2,260,381**	**771,076**	**22.45%**

Exhibit 5 Manure to land ratio per state

Manure to Land Ratio (times)							
Daily				Annually			
State		Total	Farming	State		Total	Farming
Alabama		1.07	6.83	Alabama		390.74	2,492.66
Alaska		0.00	0.03	Alaska		0.02	10.57
Arizona		0.02	0.08	Arizona		9.08	27.44
Arkansas		1.01	2.96	Arkansas		368.50	1,079.96
California		0.11	0.50	California		41.15	183.23
Colorado		0.08	0.21	Colorado		29.36	75.90
Connecticut		0.02	0.39	Connecticut		9.11	141.99
Delaware		5.86	16.67	Delaware		2,137.85	6,083.38
Florida		0.15	0.68	Florida		54.63	247.36
Georgia		1.15	7.74	Georgia		420.67	2,823.35
Hawaii		0.06	0.26	Hawaii		20.55	93.83
Idaho		0.08	0.45	Idaho		30.46	163.09
Illinois		0.11	0.16	Illinois		39.28	59.29
Indiana		0.22	0.39	Indiana		79.23	140.73
Iowa		0.42	0.56	Iowa		153.25	203.01
Kansas		0.21	0.29	Kansas		76.20	106.84
Kentucky		0.51	1.35	Kentucky		186.62	493.11
Louisiana		0.05	0.24	Louisiana		17.58	86.37
Maine		0.01	0.26	Maine		2.50	95.03
Maryland		1.52	6.37	Maryland		554.97	2,326.06
Massachusetts		0.01	0.30	Massachusetts		4.91	109.97
Michigan		0.10	0.45	Michigan		35.07	165.26
Minnesota		0.22	0.51	Minnesota		79.07	185.82
Mississippi		0.78	3.49	Mississippi		283.32	1,274.67

Exhibit 5.2 Manure to land ratio per state [continuation]

Manure to Land Ratio (times)							
Daily				Annually			
State		Total	Farming	State		Total	Farming
Missouri		0.42	0.83	Missouri		153.37	302.70
Montana		0.05	0.08	Montana		17.07	30.75
Nebraska		0.24	0.28	Nebraska		87.24	103.00
Nevada		0.01	0.13	Nevada		3.73	48.84
New Hampshire		0.01	0.42	New Hampshire		3.59	153.84
New Jersey		0.01	0.09	New Jersey		3.63	34.07
New Mexico		0.03	0.06	New Mexico		12.45	23.54
New York		0.11	0.69	New York		39.64	250.67
North Carolina		0.97	5.23	North Carolina		355.57	1,909.21
North Dakota		0.07	0.09	North Dakota		25.09	32.43
Ohio		0.26	0.59	Ohio		95.84	217.01
Oklahoma		0.36	0.52	Oklahoma		131.30	190.48
Oregon		0.04	0.17	Oregon		13.99	62.34
Pennsylvania		0.37	2.09	Pennsylvania		133.95	763.46
Rhode Island		0.01	0.28	Rhode Island		4.44	101.31
South Carolina		0.41	3.18	South Carolina		151.19	1,160.33
South Dakota		0.15	0.18	South Dakota		54.41	66.61
Tennessee		0.32	1.00	Tennessee		118.56	363.54
Texas		0.24	0.34	Texas		86.28	125.06
Utah		0.04	0.19	Utah		13.57	70.78
Vermont		0.09	0.87	Vermont		34.61	318.48
Virginia		0.45	2.02	Virginia		165.50	738.23
Washington		0.06	0.24	Washington		20.74	87.08
West Virginia		0.24	1.59	West Virginia		86.57	580.24
Wisconsin		0.26	0.83	Wisconsin		94.39	302.41
Wyoming		0.04	0.08	Wyoming		13.12	27.83
TOTAL		0.20	0.58	TOTAL		72.26	211.84

Supplementary exhibits

Exhibit 6 Percentual analysis of animals raised by state

% ANALYSIS OF NUMBER OF ANIMALS RAISED PER STATE								
State	**Chicken**	**Laying hen**	**Turkeys**	**Pigs and Hogs**	**Cow/calves**	**Cows for milk**		**Total**
Alabama	98.90%	0.95%	0.00%	0.03%	0.12%	0.00%		100%
Alaska	0.00%	0.00%	0.00%	18.75%	81.25%	0.00%		100%
Arizona	0.00%	0.00%	0.00%	21.84%	62.21%	15.95%		100%
Arkansas	95.42%	1.55%	2.73%	0.13%	0.17%	0.00%		100%
California	0.00%	48.39%	35.21%	0.62%	10.40%	5.37%		100%
Colorado	0.00%	52.31%	0.00%	24.14%	22.25%	1.31%		100%
Connecticut	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%		100%
Delaware	99.99%	0.00%	0.00%	0.00%	0.01%	0.00%		100%
Florida	82.81%	14.99%	0.00%	0.04%	2.01%	0.16%		100%
Georgia	98.18%	1.69%	0.00%	0.05%	0.08%	0.00%		100%
Hawaii	0.00%	0.00%	0.00%	11.80%	88.20%	0.00%		100%
Idaho	0.00%	0.00%	0.00%	0.00%	74.55%	25.45%		100%
Illinois	0.00%	33.85%	0.00%	59.79%	5.88%	0.49%		100%
Indiana	0.00%	56.86%	28.65%	13.16%	1.05%	0.28%		100%
Iowa	0.00%	50.03%	7.63%	39.11%	3.05%	0.18%		100%
Kansas	0.00%	0.00%	0.00%	33.77%	64.65%	1.57%		100%
Kentucky	97.15%	1.93%	0.00%	0.23%	0.68%	0.00%		100%
Louisiana	0.00%	77.30%	0.00%	0.23%	22.47%	0.00%		100%
Maine	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%		100%
Maryland	98.74%	1.20%	0.00%	0.00%	0.06%	0.00%		100%
Massachusetts	0.00%	84.92%	0.00%	0.00%	15.08%	0.00%		100%
Michigan	0.00%	67.63%	19.12%	8.91%	2.78%	1.56%		100%
Minnesota	37.79%	11.20%	33.39%	15.66%	1.58%	0.37%		100%
Mississippi	98.80%	0.92%	0.00%	0.16%	0.12%	0.00%		100%

Exhibit 6.2 Percentual analysis of animals raised by state [continuation]

% ANALYSIS OF NUMBER OF ANIMALS RAISED PER STATE								
State	**Chicken**	**Laying hen**	**Turkeys**	**Pigs and Hogs**	**Cow/calves**	**Cows for milk**		**Total**
Missouri	86.25%	4.28%	5.56%	2.63%	1.27%	0.00%		100%
Montana	0.00%	17.85%	0.00%	12.60%	69.55%	0.00%		100%
Nebraska	0.00%	43.73%	0.00%	30.53%	25.74%	0.00%		100%
Nevada	0.00%	0.00%	0.00%	1.33%	98.67%	0.00%		100%
New Hampshire	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%		100%
New Jersey	0.00%	0.00%	0.00%	30.00%	70.00%	0.00%		100%
New Mexico	0.00%	0.00%	0.00%	0.21%	76.97%	22.82%		100%
New York	0.00%	81.58%	0.00%	1.75%	9.72%	6.96%		100%
North Carolina	92.61%	1.97%	3.49%	1.84%	0.09%	0.00%		100%
North Dakota	0.00%	0.00%	0.00%	32.21%	67.79%	0.00%		100%
Ohio	59.24%	32.84%	3.83%	3.13%	0.76%	0.19%		100%
Oklahoma	92.79%	1.43%	0.00%	3.64%	2.14%	0.00%		100%
Oregon	0.00%	72.39%	0.00%	0.29%	24.75%	2.57%		100%
Pennsylvania	80.09%	15.60%	2.73%	0.89%	0.46%	0.22%		100%
Rhode Island	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%		100%
South Carolina	97.51%	2.24%	0.00%	0.11%	0.14%	0.00%		100%
South Dakota	0.00%	18.90%	28.11%	27.83%	24.40%	0.76%		100%
Tennessee	98.00%	0.79%	0.00%	0.24%	0.97%	0.00%		100%
Texas	93.93%	3.78%	0.00%	0.40%	1.82%	0.08%		100%
Utah	0.00%	51.35%	30.86%	10.77%	6.24%	0.79%		100%
Vermont	0.00%	41.44%	0.00%	0.00%	29.50%	29.05%		100%
Virginia	92.13%	1.26%	5.96%	0.11%	0.50%	0.03%		100%
Washington	0.00%	89.71%	0.00%	0.00%	7.84%	2.45%		100%
West Virginia	95.18%	1.36%	3.05%	0.00%	0.41%	0.00%		100%
Wisconsin	82.97%	10.36%	0.00%	1.21%	3.49%	1.97%		100%
Wyoming	0.00%	0.00%	0.00%	32.86%	67.14%	0.00%		100%

Exhibit 7 Percentual representation of animals raised in the entire U.S. by state

% REPRESENTATION OF NUMBER OF ANIMALS RAISED PER STATE						
State	**Chicken**	**Laying hen**	**Turkeys**	**Pigs and Hogs**	**Cow/calves**	**Cows for milk**
Alabama	13.33%	2.37%	0.00%	0.21%	1.53%	0.00%
Alaska	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%
Arizona	0.00%	0.00%	0.00%	0.17%	0.91%	2.27%
Arkansas	11.84%	3.55%	13.53%	0.80%	2.06%	0.00%
California	0.00%	3.58%	5.66%	0.13%	4.00%	20.15%
Colorado	0.00%	1.44%	0.00%	1.83%	3.17%	1.81%
Connecticut	0.00%	0.00%	0.00%	0.00%	0.06%	0.00%
Delaware	3.01%	0.00%	0.00%	0.00%	0.02%	0.00%
Florida	0.80%	2.67%	0.00%	0.02%	1.86%	1.41%
Georgia	16.49%	5.24%	0.00%	0.43%	1.30%	0.00%
Hawaii	0.00%	0.00%	0.00%	0.01%	0.17%	0.00%
Idaho	0.00%	0.00%	0.00%	0.00%	2.06%	6.87%
Illinois	0.00%	1.47%	0.00%	7.19%	1.33%	1.07%
Indiana	0.00%	8.68%	9.50%	5.56%	0.83%	2.14%
Iowa	0.00%	13.52%	4.48%	29.23%	4.28%	2.48%
Kansas	0.00%	0.00%	0.00%	2.05%	7.36%	1.75%
Kentucky	3.79%	1.39%	0.00%	0.46%	2.54%	0.00%
Louisiana	0.00%	0.61%	0.00%	0.01%	0.92%	0.00%
Maine	0.00%	0.00%	0.00%	0.00%	0.10%	0.00%
Maryland	3.73%	0.84%	0.00%	0.00%	0.22%	0.00%
Massachusetts	0.00%	0.05%	0.00%	0.00%	0.04%	0.00%
Michigan	0.00%	4.17%	2.56%	1.52%	0.89%	4.88%
Minnesota	0.57%	3.12%	20.18%	12.06%	2.29%	5.27%
Mississippi	8.89%	1.52%	0.00%	0.73%	1.05%	0.00%

Exhibit 7.2 Percentual representation of animals raised in the entire U.S. by state [continuation]

% REPRESENTATION OF NUMBER OF ANIMALS RAISED PER STATE						
State	**Chicken**	**Laying hen**	**Turkeys**	**Pigs and Hogs**	**Cow/calves**	**Cows for milk**
Missouri	3.63%	3.32%	9.35%	5.63%	5.13%	0.00%
Montana	0.00%	0.15%	0.00%	0.30%	3.12%	0.00%
Nebraska	0.00%	2.49%	0.00%	4.80%	7.60%	0.00%
Nevada	0.00%	0.00%	0.00%	0.00%	0.52%	0.00%
New Hampshire	0.00%	0.00%	0.00%	0.00%	0.04%	0.00%
New Jersey	0.00%	0.00%	0.00%	0.01%	0.03%	0.00%
New Mexico	0.00%	0.00%	0.00%	0.00%	1.30%	3.75%
New York	0.00%	1.65%	0.00%	0.10%	1.02%	7.14%
North Carolina	10.12%	3.97%	15.26%	10.25%	0.98%	0.00%
North Dakota	0.00%	0.00%	0.00%	0.54%	2.13%	0.00%
Ohio	0.99%	10.11%	2.56%	2.66%	1.22%	3.01%
Oklahoma	2.67%	0.76%	0.00%	5.34%	5.89%	0.00%
Oregon	0.00%	0.79%	0.00%	0.01%	1.41%	1.42%
Pennsylvania	2.34%	8.41%	3.20%	1.33%	1.29%	6.03%
Rhode Island	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%
South Carolina	2.99%	1.26%	0.00%	0.17%	0.40%	0.00%
South Dakota	0.00%	0.66%	2.12%	2.67%	4.40%	1.34%
Tennessee	2.28%	0.34%	0.00%	0.28%	2.16%	0.00%
Texas	7.49%	5.55%	0.00%	1.61%	13.89%	5.82%
Utah	0.00%	1.36%	1.77%	0.79%	0.86%	1.06%
Vermont	0.00%	0.04%	0.00%	0.00%	0.15%	1.48%
Virginia	3.23%	0.82%	8.37%	0.20%	1.69%	1.00%
Washington	0.00%	2.27%	0.00%	0.00%	1.03%	3.15%
West Virginia	1.15%	0.30%	1.48%	0.00%	0.48%	0.00%
Wisconsin	0.66%	1.53%	0.00%	0.49%	2.67%	14.70%
Wyoming	0.00%	0.00%	0.00%	0.41%	1.57%	0.00%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Exhibit 8 Total animal to state percentual representation

State % Representation		
State	**Total (x1000)**	**% Representation**
Alabama	1,094,982	12.14%
Alaska	16	0.00%
Arizona	1,241	0.01%
Arkansas	1,008,201	11.17%
California	32,657	0.36%
Colorado	12,100	0.13%
Connecticut	48	0.00%
Delaware	244,316	2.71%
Florida	78,616	0.87%
Georgia	1,364,499	15.12%
Hawaii	161	0.00%
Idaho	2,350	0.03%
Illinois	19,172	0.21%
Indiana	67,357	0.75%
Iowa	119,196	1.32%
Kansas	9,664	0.11%
Kentucky	316,719	3.51%
Louisiana	3,472	0.04%
Maine	84	0.00%
Maryland	307,386	3.41%
Massachusetts	252	0.00%
Michigan	27,200	0.30%
Minnesota	122,788	1.36%
Mississippi	731,279	8.10%
Missouri	341,556	3.79%
Montana	3,810	0.04%
Nebraska	25,061	0.28%

Exhibit 8.2 Total animal to state percentual representation [continuation]

State % Representation		
State	**Total (x1000)**	**% Representation**
Nevada	451	0.00%
New Hampshire	35	0.00%
New Jersey	40	0.00%
New Mexico	1,433	0.02%
New York	8,934	0.10%
North Carolina	888,385	9.85%
North Dakota	2,670	0.03%
Ohio	135,720	1.50%
Oklahoma	233,860	2.59%
Oregon	4,832	0.05%
Pennsylvania	237,730	2.63%
Rhode Island	5	0.00%
South Carolina	248,786	2.76%
South Dakota	15,299	0.17%
Tennessee	188,981	2.09%
Texas	648,048	7.18%
Utah	11,667	0.13%
Vermont	444	0.00%
Virginia	285,242	3.16%
Washington	11,174	0.12%
West Virginia	98,445	1.09%
Wisconsin	64,966	0.72%
Wyoming	1,981	0.02%
Total	**9,023,311**	**100%**

Exhibit 9 Animal percentual representation

Animal % Representation		
Species	**Total**	**% Representation**
Chicken	8,126,000	90.06%
Laying hen	441,034	4.89%
Turkeys	203,200	2.25%
Pigs and Hogs	159,492	1.77%
Cow/calves	84,876	0.94%
Dairy cows	8,709	0.10%
Total	**9,023,311**	**100%**

Exhibit 10 Percentual analysis of lbs of manure generated per state

% ANALYSIS OF LBS OF MANURE GENERATED PER STATE								
State	**Chicken**	**Laying hen**	**Turkeys**	**Pigs and Hogs**	**Cow/calves**	**Cows for milk**		**Total**
Alabama	83.49%	0.74%	0.00%	0.58%	15.18%	0.00%		100%
Alaska	0.00%	0.00%	0.00%	3.41%	96.59%	0.00%		100%
Arizona	0.00%	0.00%	0.00%	2.97%	55.26%	41.77%		100%
Arkansas	72.76%	1.09%	3.87%	2.23%	20.04%	0.00%		100%
California	0.00%	1.09%	1.60%	0.35%	38.42%	58.54%		100%
Colorado	0.00%	1.06%	0.00%	12.26%	73.90%	12.78%		100%
Connecticut	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%		100%
Delaware	99.02%	0.00%	0.00%	0.00%	0.98%	0.00%		100%
Florida	17.58%	2.94%	0.00%	0.19%	64.47%	14.82%		100%
Georgia	86.80%	1.38%	0.00%	1.02%	10.79%	0.00%		100%
Hawaii	0.00%	0.00%	0.00%	2.00%	98.00%	0.00%		100%
Idaho	0.00%	0.00%	0.00%	0.00%	49.85%	50.15%		100%
Illinois	0.00%	1.24%	0.00%	54.88%	35.29%	8.58%		100%
Indiana	0.00%	7.58%	7.71%	44.04%	22.87%	17.81%		100%
Iowa	0.00%	3.06%	0.94%	60.03%	30.60%	5.36%		100%
Kansas	0.00%	0.00%	0.00%	6.94%	86.84%	6.23%		100%
Kentucky	46.80%	0.86%	0.00%	2.60%	49.75%	0.00%		100%
Louisiana	0.00%	2.05%	0.00%	0.15%	97.80%	0.00%		100%
Maine	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%		100%
Maryland	90.58%	1.02%	0.00%	0.00%	8.41%	0.00%		100%
Massachusetts	0.00%	3.32%	0.00%	0.00%	96.68%	0.00%		100%
Michigan	0.00%	4.39%	2.50%	14.51%	29.56%	49.04%		100%
Minnesota	4.30%	1.18%	7.07%	41.25%	27.23%	18.98%		100%
Mississippi	81.14%	0.70%	0.00%	3.03%	15.14%	0.00%		100%
Missouri	24.34%	1.12%	2.92%	17.19%	54.43%	0.00%		100%
Montana	0.00%	0.15%	0.00%	2.69%	97.16%	0.00%		100%

Exhibit 11 Percentual analysis of lbs of manure generated per state [continuation]

% ANALYSIS OF LBS OF MANURE GENERATED PER STATE								
State	**Chicken**	**Laying hen**	**Turkeys**	**Pigs and Hogs**	**Cow/calves**	**Cows for milk**		**Total**
Nebraska	0.00%	0.87%	0.00%	15.22%	83.91%	0.00%		100%
Nevada	0.00%	0.00%	0.00%	0.21%	99.79%	0.00%		100%
New Hampshire	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%		100%
New Jersey	0.00%	0.00%	0.00%	6.15%	93.85%	0.00%		100%
New Mexico	0.00%	0.00%	0.00%	0.02%	53.36%	46.62%		100%
New York	0.00%	1.60%	0.00%	0.86%	31.34%	66.19%		100%
North Carolina	58.73%	1.15%	4.12%	27.02%	8.97%	0.00%		100%
North Dakota	0.00%	0.00%	0.00%	6.77%	93.23%	0.00%		100%
Ohio	15.96%	8.17%	1.92%	19.54%	31.20%	23.21%		100%
Oklahoma	18.48%	0.26%	0.00%	16.79%	64.47%	0.00%		100%
Oregon	0.00%	1.35%	0.00%	0.14%	75.46%	23.06%		100%
Pennsylvania	27.75%	4.99%	1.76%	7.18%	24.17%	34.15%		100%
Rhode Island	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%		100%
South Carolina	79.36%	1.68%	0.00%	2.11%	16.84%	0.00%		100%
South Dakota	0.00%	0.37%	1.10%	13.56%	77.78%	7.19%		100%
Tennessee	39.06%	0.29%	0.00%	2.21%	58.44%	0.00%		100%
Texas	22.52%	0.84%	0.00%	2.20%	66.07%	8.37%		100%
Utah	0.00%	2.87%	3.48%	15.10%	57.23%	21.32%		100%
Vermont	0.00%	0.22%	0.00%	0.00%	25.57%	74.21%		100%
Virginia	46.84%	0.59%	5.64%	1.34%	38.67%	6.92%		100%
Washington	0.00%	3.50%	0.00%	0.00%	50.21%	46.29%		100%
West Virginia	57.86%	0.76%	3.45%	0.06%	37.87%	0.00%		100%
Wisconsin	5.43%	0.63%	0.00%	1.83%	34.60%	57.51%		100%
Wyoming	0.00%	0.00%	0.00%	6.96%	93.04%	0.00%		100%

Exhibit 12 Percentual representation of Manure generated in the entire U.S. by state

% REPRESENTATION OF LBS OF MANURE GENERATED PER STATE						
State	**Chicken**	**Laying hen**	**Turkeys**	**Pigs and Hogs**	**Cow/calves**	**Cows for milk**
Alabama	13.33%	2.37%	0.00%	0.21%	1.53%	0.00%
Alaska	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%
Arizona	0.00%	0.00%	0.00%	0.17%	0.91%	2.27%
Arkansas	11.84%	3.55%	13.53%	0.80%	2.06%	0.00%
California	0.00%	3.58%	5.66%	0.13%	4.00%	20.15%
Colorado	0.00%	1.44%	0.00%	1.83%	3.17%	1.81%
Connecticut	0.00%	0.00%	0.00%	0.00%	0.06%	0.00%
Delaware	3.01%	0.00%	0.00%	0.00%	0.02%	0.00%
Florida	0.80%	2.67%	0.00%	0.02%	1.86%	1.41%
Georgia	16.49%	5.24%	0.00%	0.43%	1.30%	0.00%
Hawaii	0.00%	0.00%	0.00%	0.01%	0.17%	0.00%
Idaho	0.00%	0.00%	0.00%	0.00%	2.06%	6.87%
Illinois	0.00%	1.47%	0.00%	7.19%	1.33%	1.07%
Indiana	0.00%	8.68%	9.50%	5.56%	0.83%	2.14%
Iowa	0.00%	13.52%	4.48%	29.23%	4.28%	2.48%
Kansas	0.00%	0.00%	0.00%	2.05%	7.36%	1.75%
Kentucky	3.79%	1.39%	0.00%	0.46%	2.54%	0.00%
Louisiana	0.00%	0.61%	0.00%	0.01%	0.92%	0.00%
Maine	0.00%	0.00%	0.00%	0.00%	0.10%	0.00%
Maryland	3.73%	0.84%	0.00%	0.00%	0.22%	0.00%
Massachusetts	0.00%	0.05%	0.00%	0.00%	0.04%	0.00%
Michigan	0.00%	4.17%	2.56%	1.52%	0.89%	4.88%
Minnesota	0.57%	3.12%	20.18%	12.06%	2.29%	5.27%
Mississippi	8.89%	1.52%	0.00%	0.73%	1.05%	0.00%
Missouri	3.63%	3.32%	9.35%	5.63%	5.13%	0.00%
Montana	0.00%	0.15%	0.00%	0.30%	3.12%	0.00%

Exhibit 13 Percentual representation of Manure generated in the entire U.S. by state [continuation]

% REPRESENTATION OF LBS OF MANURE GENERATED PER STATE						
State	**Chicken**	**Laying hen**	**Turkeys**	**Pigs and Hogs**	**Cow/calves**	**Cows for milk**
Nebraska	0.00%	2.49%	0.00%	4.80%	7.60%	0.00%
Nevada	0.00%	0.00%	0.00%	0.00%	0.52%	0.00%
New Hampshire	0.00%	0.00%	0.00%	0.00%	0.04%	0.00%
New Jersey	0.00%	0.00%	0.00%	0.01%	0.03%	0.00%
New Mexico	0.00%	0.00%	0.00%	0.00%	1.30%	3.75%
New York	0.00%	1.65%	0.00%	0.10%	1.02%	7.14%
North Carolina	10.12%	3.97%	15.26%	10.25%	0.98%	0.00%
North Dakota	0.00%	0.00%	0.00%	0.54%	2.13%	0.00%
Ohio	0.99%	10.11%	2.56%	2.66%	1.22%	3.01%
Oklahoma	2.67%	0.76%	0.00%	5.34%	5.89%	0.00%
Oregon	0.00%	0.79%	0.00%	0.01%	1.41%	1.42%
Pennsylvania	2.34%	8.41%	3.20%	1.33%	1.29%	6.03%
Rhode Island	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%
South Carolina	2.99%	1.26%	0.00%	0.17%	0.40%	0.00%
South Dakota	0.00%	0.66%	2.12%	2.67%	4.40%	1.34%
Tennessee	2.28%	0.34%	0.00%	0.28%	2.16%	0.00%
Texas	7.49%	5.55%	0.00%	1.61%	13.89%	5.82%
Utah	0.00%	1.36%	1.77%	0.79%	0.86%	1.06%
Vermont	0.00%	0.04%	0.00%	0.00%	0.15%	1.48%
Virginia	3.23%	0.82%	8.37%	0.20%	1.69%	1.00%
Washington	0.00%	2.27%	0.00%	0.00%	1.03%	3.15%
West Virginia	1.15%	0.30%	1.48%	0.00%	0.48%	0.00%
Wisconsin	0.66%	1.53%	0.00%	0.49%	2.67%	14.70%
Wyoming	0.00%	0.00%	0.00%	0.41%	1.57%	0.00%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Exhibit 14 Total manure to state percentual representation

State % Representation		
State	**Total (x100)**	**% Representation**
Alabama	386,498	4.42%
Alaska	607	0.01%
Arizona	63,040	0.72%
Arkansas	394,022	4.51%
California	398,750	4.56%
Colorado	164,386	1.88%
Connecticut	2,166	0.02%
Delaware	73,523	0.84%
Florida	110,376	1.26%
Georgia	459,908	5.26%
Hawaii	6,539	0.07%
Idaho	158,593	1.81%
Illinois	144,097	1.65%
Indiana	138,932	1.59%
Iowa	535,811	6.13%
Kansas	324,679	3.71%
Kentucky	195,933	2.24%
Louisiana	35,991	0.41%
Maine	3,791	0.04%
Maryland	99,854	1.14%
Massachusetts	1,774	0.02%
Michigan	115,265	1.32%
Minnesota	321,707	3.68%
Mississippi	265,347	3.03%
Missouri	360,627	4.12%
Montana	123,080	1.41%

Exhibit 15 Total manure to state percentual representation [continuation]

State % Representation		
State	**Total (x100)**	**% Representation**
Nebraska	346,862	3.97%
Nevada	20,122	0.23%
New Hampshire	1,579	0.02%
New Jersey	1,346	0.02%
New Mexico	93,285	1.07%
New York	124,975	1.43%
North Carolina	417,426	4.77%
North Dakota	87,610	1.00%
Ohio	150,113	1.72%
Oklahoma	349,964	4.00%
Oregon	71,520	0.82%
Pennsylvania	204,451	2.34%
Rhode Island	226	0.00%
South Carolina	91,093	1.04%
South Dakota	216,568	2.48%
Tennessee	141,306	1.62%
Texas	805,447	9.21%
Utah	57,399	0.66%
Vermont	23,119	0.26%
Virginia	167,210	1.91%
Washington	78,728	0.90%
West Virginia	48,258	0.55%
Wisconsin	296,017	3.39%
Wyoming	64,508	0.74%
Total	**8,744,430**	**100%**

Exhibit 16 Manure per species percentual representation

Manure % Representation		
Species	**Total (x1000)**	**% Representation**
Chicken	2,421,548	27.69%
Laying hen	121,284	1.39%
Turkeys	112,776	1.29%
Pigs and Hogs	1,100,495	12.59%
Cow/calves	3,830,030	43.80%
Dairy cows	1,158,297	13.25%
Total	**8,744,430**	**100%**

Exhibit 17 Recommended application calculations and U.S. total land representation

Reccomended Application (R.A.) (x1000)						
	Chicken	Laying hen	Turkeys	Pigs and Hogs	Cow/calves	Cows for milk
lbs/acre	10	10	10	50	28	50
		Generated Daily				
Species	Manure/day	R.A. (lbs/acre)	U.S. Land Mass (acres)			
Chicken	2,421,548	242,155				
Laying hen	121,284	12,128.44				
Turkeys	112,776	11,278				
Pigs and Hogs	1,100,495	22,009.90				
Cow/calves	3,830,030	136,786.77				
Cows for milk	1,158,297	23,165.94				
			Total		Farming	
Total	8,744,430	447,523	2,260,381		771,076	
		Representation (%)	19.80%		58.04%	
		Extra Land	1,812,858		323,552	
		DAILY				

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