**Feeding Food Scraps to Laying Hens**

**Black Dirt Farm SARE Project Notes**

**Highlighted Findings**

* Feeding laying hens on compost is a **viable practice** **that requires further exploration and refinement**
* This is a **scalable practice**, and appears to be scalable to at least 3-5,000 hens.
* Food scraps are an abundant local resource.
* Food scraps **do not provide a homogenous balanced ration**. It appears the limiting factor is the nutritional inconsistency of ration between individual hens.  **Protein delivery likely needs to be improved.**
* No **salmonella entridis** present at pathogenic levels in food scraps, eggs, or coop bedding.
* **Lay Rate:** Compost Group - 41%; Grain Group - 43%
* **Average Egg Weights**: Compost Group – 58.9 grams; Grain Group – 61.6%. **Compost Group eggs 4.6$ lighter.**
* **Labor:** Compost Group **roughly twice** that of Grain Group
* In both groups cost of labor exceeded value of eggs. Grain Group barely generated enough income from sales to cover grain costs.
* Compost Group **yields significant volumes of compost** for on-farm use or sale
* **Winter viability** dependant on facilities, equipment, and weather
* **Rodent control** is challenging
* **Nutrient composition** generally similar. Notable differences: Omega 3 is 50% lower, Trans Fatty Acid is 300+% higher in Compost Group eggs.
* Hens foraging on compost **require less than half the water** of grain fed birds
* Birds foraging compost get dirtier

**Recommended Infrastructure**

* Tipping dock or ramp
* Feeding Bin must have hen (foraging), truck/ trailer (tipping), and tractor access (blending, rolling, removal)
* Bin with both ends open – flow through system – would improve labor efficiency and overall efficacy.
* Having adequate composting capacity in the feeding system to support compost at various ages is preferable. Ideally hens will be able to forage each compost blend for at least two months.
* Pour concrete slab for bin. Blocks can be used for walls, but are subject to heaving and provide rat habitat. Formed walls will improve structure and improve rodent exclusion. Bin floor either retain all leachate or should be sloped to a treatment area.
* Rodent proof bin as much as possible, include embedding a wire skirt around bin 12” down
* Bin should be covered to exclude rain and snow, and preferably wind. This will also help exclude wild birds, supporting good on-farm biosecurity.
* Bin should be attached to housing or in very close vicinity to support adequate winter feeding. Preferably there will be contiguous roof connecting hen housing with the feeding bin.

**Recommended Feeding & Management Practices**

* Daily agitation of mix to ensure fresh forage for hens
* Use of livestock manures, especially horse manure, in the mix supports active composting conditions.
* Blend food scraps into proper compost mix. This will support overall microbial biodiversity and activity, adding protein to the forage and reducing the ability of pathogens to exploit and colonize the environment.
* Using a diversity of feedstocks with different particle sizes ensures a friable mix that the hens can easily scratch. Additionally, hens do not like foraging in a wet mix and like to keep their feet dry.
* Nutritional value of scraps may benefit from limited fermentation and composting. Either maximizing hen access to maturing composts or increasing retention period in the feeding system are likely to increase the overall microbial protein available to hens. This may effect amino acids in eggs.
* Ensure adequate fresh pasture
* Consider supplementing compost with flax seeds to increase Omega 3 Fatty Acids
* Explore opportunities to reduce moisture and increase blending/ homogenizing food scraps

 **qAS**

**Productivity**

**2014-15 Daily Lay Rate Averages on Monthly Basis**

|  |  |  |
| --- | --- | --- |
|  | **Compost %Lay Adj** | **Grain %Lay Adj** |
| **October**  | 6% | 7% |
| **November** | 23% | 24% |
| **December** | 31% | 38% |
| **January** | 35% | 43% |
| **February** | 27% | 42% |
| **March** | 31% | 42% |
| **April** | 56% | 44% |
| **May** | 53% | 59% |
| **June** | 52% | 55% |
| **July** | 50% | 50% |
| **August** | 43% | 54% |
| **September** | 37% | 42% |

Due to flock changes in the fall of 2014, and weather and operational challenges during the 2014-15 winter, we feel the April-September 2015 data is the most useful. During this period our **average lay rate for the compost group was 41% and the grain group was 43%.**

**Notes:**

**1. Flock size** - our two groups' total bird count fluctuated to some extent due to a porous dividing fence and on-going construction happening in the barn.  Our inability to track this regularly means that the reflected laying rates are based on actual eggs collected, and averaged flock sizes over a given month.

**2. Winter Months** - the productivity shown for the middle of January through the beginning of March is distorted because of various factors that resulted in challenging operating conditions during this time period, which caused us to feed the Compost Group with grain during this time.  1. Our region of northeastern Vermont experienced record breaking cold that endured most of the winter, with night time temperatures regularly below -25F for sustained periods.  Our feeding bin is roughly 50 feet from the coop, and while we dug paths for the hens, on the cold and windy days they were often unwilling to travel to the feeding bin.  2. Repeated tractor break downs rendered us incapable of managing the compost feeding system, causing it to partially freeze and preventing us from exposing fresh food for the hens to eat

**LABOR**

**COST ANALYSIS**

|  |  |  |  |
| --- | --- | --- | --- |
| **Cost Comparison**  |  |  |  |
| **Compost vs. Grain** |  |  |  |
| **10/1/14 - 9/30/15** |  |  |  |
|  |  |  |  |
| **Notes:** |  |  |  |
| 1. Costs for Managing 50 hens in each group |  |
| 2. Labor & Expenses do not include tasks which feeding practice does not effect, including  |
| egg collection, coop clean out, washing and packing eggs, bedding, carton labels, etc. |
| 3. Eggs from Compost fed hens cannot be sold as Organic. Grain fed hens show Organic  |
| price. |  |  |  |
|  |  |  |  |
| **Income** |  |  |  |
| **Description** | **Compost** | **Grain** | **Notes** |
| Egg Sales | $1,922 | $2,431 | Grain eggs organic price |
| Compost - Farm Use | $6,000 | $200 | 150 yrds farm use@$40/yrd |
| Compost - Sale | $5,000 | $0 | 100 yrds sold @ $50/yrd |
| Tipping Fees | $9,100 | $0 | $25/ ton |
|  |   |   |  |
| **Total** | **$22,022** | **$2,631** |  |
| **Total w/out Tip Fees** | **$12,922** |   |  |
|  |   |   |  |
|  |   |   |  |
| **Expenses** |   |   |  |
| **Description** | **Compost** | **Grain** | **Notes** |
| Labor | $3,870 | $2,226 | loaded rate - $25/ hr  |
| Truck O&M | $0 | $309 | $0.56/ mi. Avoidable cost. |
| Tractor O&M | $3,009 | $0 | $35/ hr O&M rate |
| Grain | $156 | $2,106 | 0.25lbs/ bird/ day |
|  |   |   |  |
|  |   |   |  |
| **Total** | **$7,035** | **$4,641** |  |
|  |   |   |  |
| **Net Income** | **$14,987** | **-$2,010** |  |
| **Net Income w/out Tip Fees** | **$5,887** |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Egg Nutritional Analysis** |  |  |  |
| **Compost vs Grain Comparison** |  |  |
|  |  |  |  |  |
| **Analysis Description** | **Compost Avg** | **Grain Avg** | **% Dif** | **notes** |
| Cholesterol | 4.85 | 4.74 | 102% | % |
| Calcium | 500.00 | 488.67 | 102% | ppm |
| Folic Acid | 0.58 | 0.45 | 131% | % |
| **Fatty Acids** |  |  |  |  |
| Saturated Fatty Acids | 3.21 | 2.92 | 110% | % |
| Unsaturated Fatty Acid | 5.89 | 6.20 | 95% | % |
| Trans Fatty Acids | 0.10 | 0.03 | 383% | % |
| Omega 3 | 0.24 | 0.48 | 49% | % |
| Omega 6 | 1.71 | 2.25 | 76% | % |
| Omega 9 | 3.89 | 3.41 | 114% | % |
| Total Fatty Acids | 9.60 | 9.55 | 101% | % |
| Linoleic | 1.49 | 2.04 | 73% | % |
| **Amino Acids** |   |   |   |   |
| threonine | 5.92 | 6.11 | 97% | mg/g |
| valine | 8.49 | 8.73 | 97% | mg/g |
| isoleucine | 6.74 | 6.96 | 97% | mg/g |
| Leucine | 10.87 | 11.10 | 98% | mg/g |
| phenylalanine | 6.81 | 7.00 | 97% | mg/g |
| lysine | 9.22 | 9.50 | 97% | mg/g |
| histidine | 2.88 | 2.89 | 100% | mg/g |

**Yoke Color Comparison**

**Group Averages Over Six Months**

**Based on DSM Color Fan – Scale of 1-15**

**Grain Group Compost Group**

 **DSM – 5 DSM - 12**