Organic Research and Extension Initiative

(OREI)

Project Title:

A WHOLE FARM APPROACH TO INCORPORATING PASTURE RAISED ORGANIC POULTRY AND A NOVEL CEREAL GRAIN (NAKED OATS) INTO A MULTI-YEAR ORGANIC ROTATION

Dr. Mike Lilburn
Dr. Larry Phelan
Dr. Marve Batte
John Anderson
Kathy Bielek
Dr. Matthew Mariola

THE OHIO STATE UNIVERSITY

COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

Organic Poultry
(Crandall et al., 2009)

- Organic foods represent 3% of total retail food sales ($ 17 billion) and organic meat is the fastest growing sector of the organic market
- Bimodal distribution, more 20's and aging baby boomers
- These consumers may have a preference for local producers, seen as safer than conventional poultry

We asked organic producers why they do not currently market certified organic pasture raised poultry.

- Difficult to find and be able to afford processing for small organic flocks.
- Expense of organic feed a major hurdle to organic production. Consumers already pay a premium for pastured poultry, may not support higher prices needed for organic production.

Organic feed costs.

- Feed is over half the cost of producing broilers.
- Organic feed typically much more expensive than conventional feed. In 2012 organic corn around $16.50/bushel.
- The National Organic Standards Board is moving towards not allowing any synthetic amino acids in organic feed, as is the case in Europe.
- Producers have limited options to get good gains from feeds that do not have optimal amino acid profiles.

Organic Standards and synthetic amino acids in poultry diets.

- The amount and ratio of amino acids determine productivity in poultry, not just the total crude protein.
- In poultry rations methionine is the first limiting essential amino acid.
- Difficult to get enough methionine to support good growth rates in organic birds without synthetic amino acids.
- Alternative approaches to coping with feed costs could be very helpful for organic producers.

What about on-farm solutions to higher feed costs/slower growth and profitable poultry production?

- Some grains have a more favorable amino acid profile than corn.
- Some of the feed ingredients could be produced on farm.
- High quality pastures provide some nutrients to poultry.
- Organic producers often take a systems approach to soil fertility and profitability. This was the approach we choose.

A Whole Farm Approach to Incorporating Pasture Raised Organic Poultry and Naked Oats into a Multi-year Organic Rotation

Six principal objectives:

- Determine the feasibility of using a high percentage of naked oats in growing and finishing rations for broilers.
- Evaluate the contribution of poultry manure to soil fertility and grain quality.
- Perform a variety trial of available naked oats.

A Whole Farm Approach to Incorporating Pasture Raised Organic Poultry and Naked Oats into a Multi-year Organic Rotation (cont.)

- Compare commercial broilers to slower growing Redbros to determine suitability to our pasture system and strain responses to diets with high levels of naked oats.
- Conduct cost/benefit analysis of this poultry/small grain production system.
- Determine how our experimental diets might translate to organic on-farm practice. Three cooperating organic farms will use the experimental diets.

Our team:

- 3 Organic producers, 2 already producing poultry but not certifying.
- Small state inspected poultry processor.
- Small organic feed mill owner.
- Organic certifier (OEFFA) very willing to work with us.
- OSU personel:
  - Dr. Mike Lilburn Poultry Nutritionist
  - Dr. Larry Phelan Soil communities/Plant Health
  - Dr. Marve Batte Economist
  - John Anderson OSU staff, Animal Sciences
  - Kathy Bielek OSU staff, Organic Program
- College of Wooster:
  - Dr. Matthew Mariola Environmental Studies

One possible grain - Naked or Hulless Oats

- Naked oats are so named because the hulls thresh free from the groat during harvest.
- Oats have a higher crude protein level and more favorable amino acid profile than corn.
- Naked oats are an improvement on hulled oats for protein and energy.
- Oats are relatively inexpensive to plant.
- Naked oats can be a very healthy addition to human diets.

Naked Oats

Hulled oats

Nutrient Analysis of Paul Naked Oat and Other Common Feed Grains - From North Dakota State University Extension

	Paul Naked Oat	Oats	Barley	Corn
Bushel Weight	42	32	48	56
Dry Matter	92	89	88	88
TDN (%)	93.5	78	84	88
Neg (Mcal/lb)	.78	.57	.64	.70
DE (kcal/kg)	3720	2760	3490	3530
Protein (%)	16.5	12.0	13.5	10.0
Lysine (%)	.65	.40	.60	.25
Fat (%)	9.0	5.1	2.1	4.2
ADF	4.6	14.2	10.7	3.8
Calcium (%)	.07	.07	.05	.02
Phosphorous	.50	.38	.38	.3

Ohio oat/corn comparison

Nutrient	Ohio Naked Oats 1	Ohio Naked Oats 2	# 2 Corn
Crude Protein	12.1	12.3	8.0
Fat	4.24	4.71	2.9
Fiber	2.45	2.48	----
Lysine	0.55	0.53	0.26
Methionine	0.20	0.21	0.18
Meth + Cyst	0.50	0.51	0.35

Incorporating Broilers into a Three Year Organic Crop Rotation

Products:

Spelt, for flour or animal feed.
Spelt straw.
Graze radish late fall?

Naked (hulless) oats. Animal feed or human food.
Oat straw

Organic poultry, clover hay or graze with ruminants

Naked Oats

Hulled Oats

Spelt

Spelt on left, clover and broilers center and oats on the right. Crops shift each year.

2 sq ft per bird with one move per day caused some stand loss in the clover.

Chicks are brooded indoors for about 3 weeks. During this period they are fed a commercial organic starter that is 20% protein with no synthetic amino acids.

Chicks placed on pasture at about 3 weeks and switched from commercial organic (20%) starter to oat/soy diet. Fed this diet until processing.

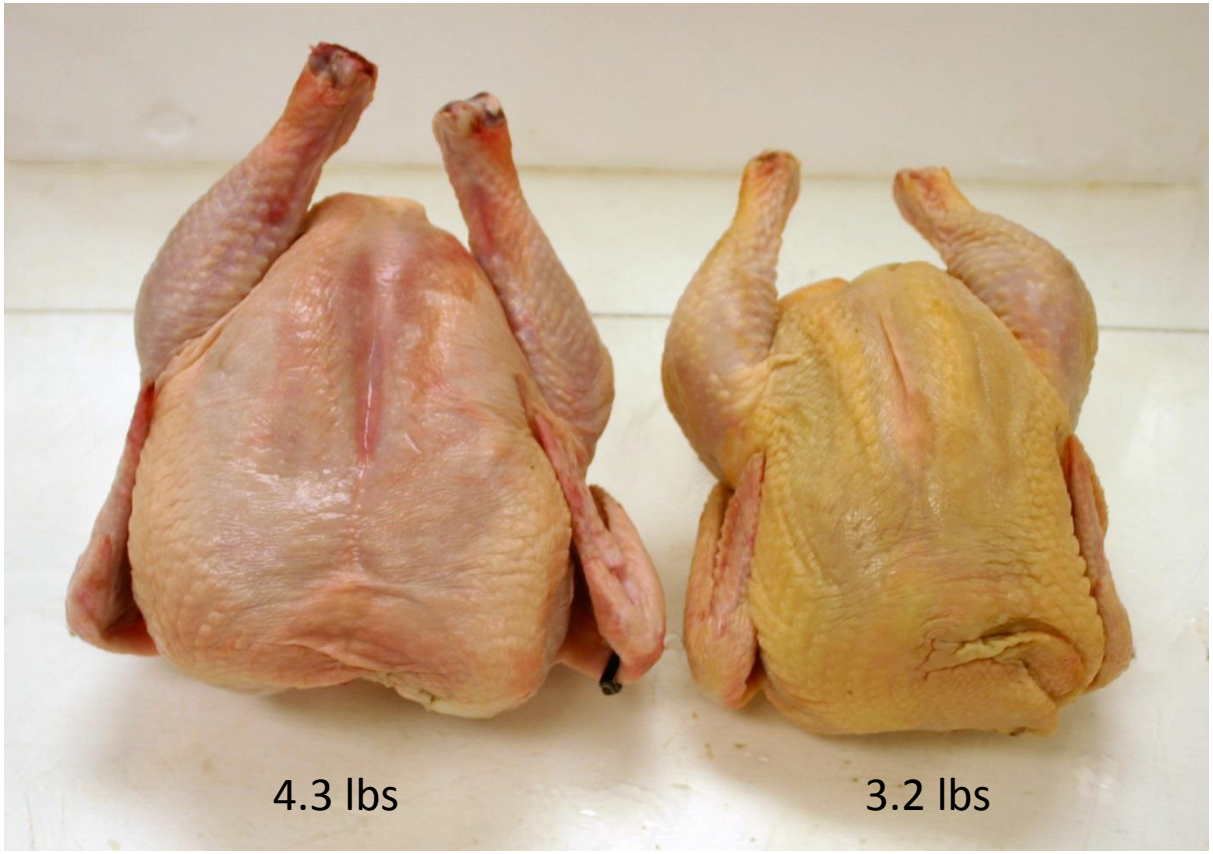
Good pasture at co-operators farm

Greenhouse reflective cover for the roof.

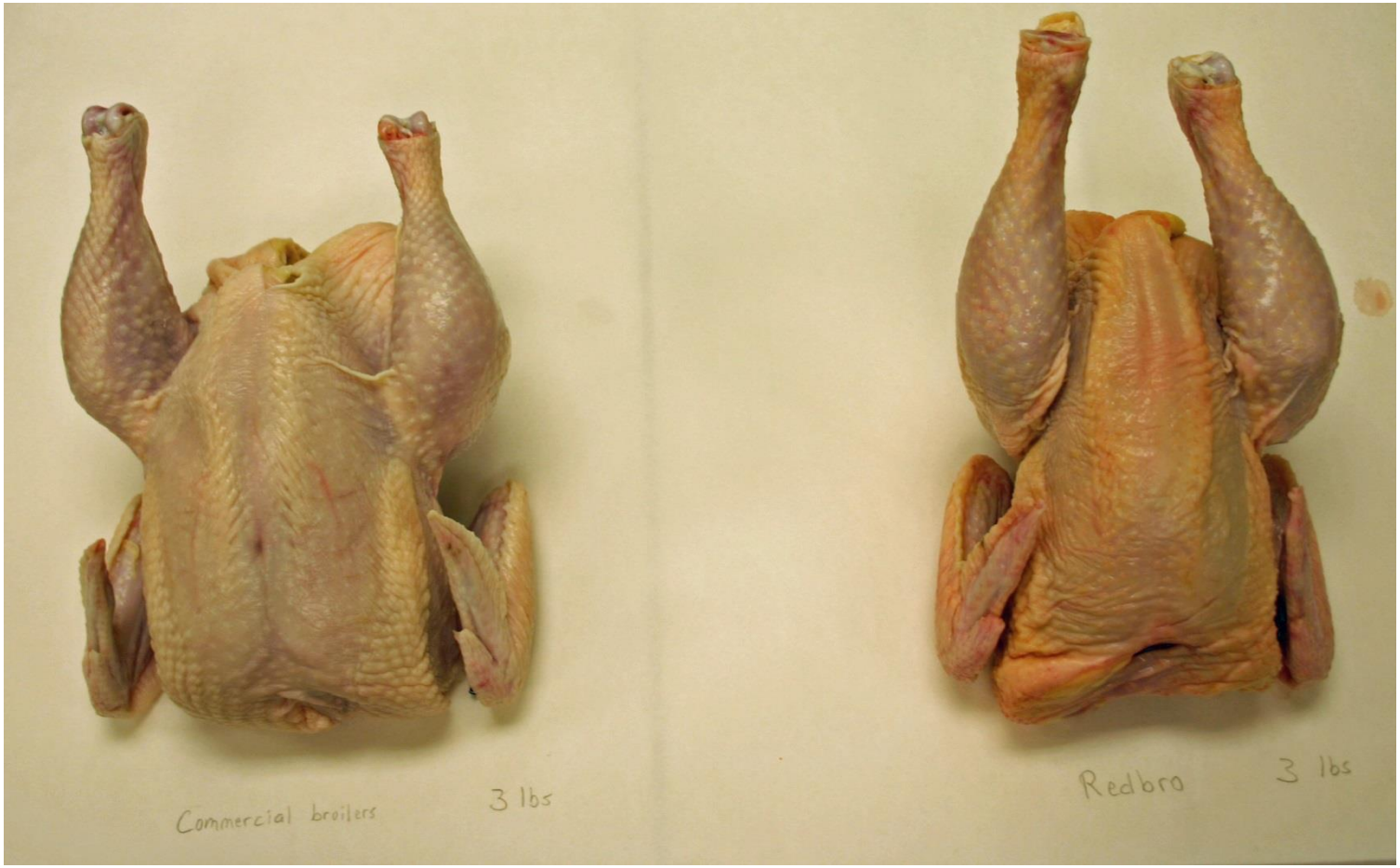
Fine Dining – The French Label Rouge has a genetic and management component

Commercial and “Redbro”

Commercial Broiler and Redbro



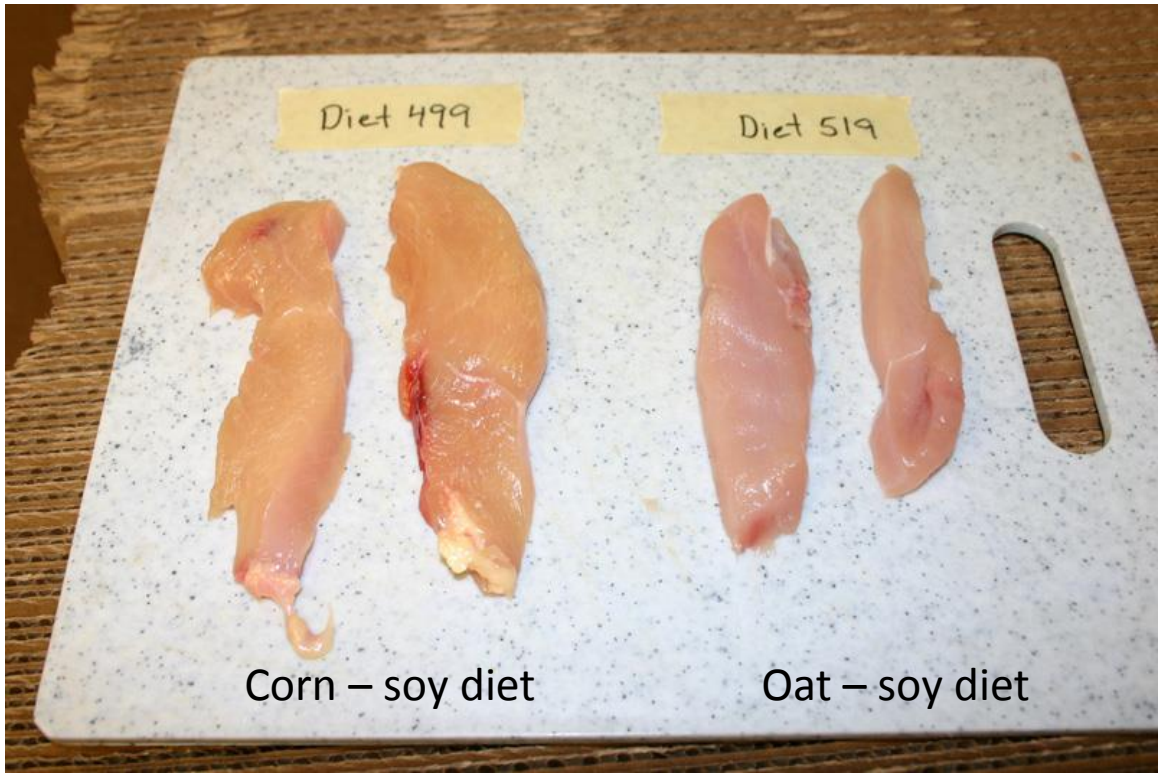
Carcass comparison at same wt.



Broiler 3 lb carcass

Reb broiler 3 lb carcass

Cross section of the breast muscle from birds raised inside.



Experimental Diets

Nutrient	65% NO/31% FFSoy	75% NO/20.6% FFSoy	85% NO/10% FFSoy
Crude Protein	19.4	16.4	13.5
Fat	8.6	8.0	7.3
Lysine	1.10	0.90	0.7
Methionine **	0.30	0.26	0.22
Meth+Cyst	0.66	0.60	0.53
Ca	0.9	0.90	0.75
** No synthetic methionine was added to any diets.			

Pastured poultry producers are usually not trying to maximize growth, so it may not be necessary to feed a diet with optimal amino acid ratios.

Naked Oats Broiler Diet

Ingredient	Percentage	lbs
Rolled/Ground Naked Oats	75	375
Roasted Soybeans	20	100
Poultry Nutri-Balancer. No synthetic A.A.	3	15
Mined Limestone/Organic CaCO3	1	5
Dicalcium Phosphate	1	5
	100	500

2012 Growth – Organic Feed

(all birds fed a commercial organic starter feed for 1st 3 weeks)

	Days to finish	Live wt lbs	Carcass Wt lbs	Dress Out %	Feed conv. Est.	Commercial feed conv. goals, similar body wt
1st grow White	51 Days	5.63	4.04	71.8		
1st grow reds	65 Days	6.34	4.18	65.9		
2nd grow white	54	6.26	4.43	70.8	1.75	About 1.74 @ 44 Days
2nd grow red	62	4.98	3.24	65	2.19	

2013 Growth – Organic Oats Feed

	Days to finish	Live wt (lbs)	Carcass wt (lbs)	Dress out %	Estimate of feed conversion (lbs of feed to lb of gain)	Commercial feed conversion goals (Ross 708) at similar body wts
1st grow white broilers	53	7.51	5.17	69	1.87	About 1.88 @ 51 days
1st grow redbros	66	7.07	4.81	68	2.51	

Carcass Weight and Cook Loss

Strain	Weight Group	Carcass Weight	Carcass DM %		Cook Loss % *	
White	Heavy	4.78	41.9		30.1	
	Medium	4.22	38.7		28.4	
	Light	3.58	39.5	(40.0)	30.7	(29.8)
RedBro	Heavy	4.85	51.8		29.1	
	Medium	4.15	46.9		28.4	
	Light	3.58	50.8	(49.8)	27.5	(28.3)
* Chicken halves cooked to a constant temperature of 160° F						

Carcass Composition

Strain	Weight Group	% Total Breast		% Thigh		% Drum	
White	Heavy	25.9		18.8		13.6	
	Medium	25.3		17.3		14.0	
	Light	22.8	(24.6)	18.0	(18.0)	14.7	(14.2)
RedBro	Heavy	16.4		18.6		16.0	
	Medium	20.4		18.6		15.5	
	Light	19.8	(19.0)	20.4	(19.2)	14.6	(15.4)

Hulless Oat Variety Trial

Groat yield in bushels per acre

Variety	2012 bu/acre	2013 bu/acre
Streaker	48.4	46
Buff	47.9	46
Paul	35	43
Excel (hulled)*	53.6	44

- Adjusted for hull
- In 2013, Streaker had significant lodging problems.

Oat variety trial

Streaker oats lodging

How many birds would 1 acre of naked oats feed from 3 wks old to finish?

- If 42 bushels/acre, 46 lbs of oats/bushel
- 42 x 46 = 1932 lbs of oats/acre
- If fed from day 25 to 53 = about 11 lbs feed.
- Feed is 75% oats = 8.25 lbs oats per bird
- 1932/8.25 = 242 birds per acre of oats at 42 bushels/acre

Return on 1 acre of naked oats, fed from 3 wks old to finish, feed mixed on-farm.

(Disclaimer, this sort of calculation can be miss-leading)

- 4.50/lb for 5 lb dressed 22.50
- Chick cost & shipping 2.00
- Processing & transport 6.00
- Starter feed (.50/lb) 1.25
- Org feed ingred., no oats .18/lb 2.00
- (No labor, pens, pasture or oats) 0.00
- = $ 11.25
- $11.25 x 242 birds/acre = $2722.50

Poultry eat chicory well too

Layers and broilers on alfalfa pasture

Open ended hoops in corn

2013

	Age (Days)	BW (lbs)	Carcass wt (lbs)	Dressing %
1st Flock Broiler	53	7.51	5.17	69
1st Flock RedBros	66	7.07	4.81	68
2nd Flock Broiler	48	4.95	3.20	62
2nd Flock RedBros	48	3.90	2.50	60.3