



Feeding Poultry on Range

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Layer Feeding: Behavior

- All domestic poultry species are Omnivores
- Heavy consumption periods
 - Early mornings 1 to 2 hrs after lights on
 - Evenings 1 to 2 hrs before lights off
- Numerous short bouts
- Egg/Meat stocks are fed to appetite
 - Stimulate appetite
 - Feed nutrient dense diets
 - Egg production
 - Muscle development

Layer Feeding: Behavior

- Birds will segregate feed
 - Size
 - Color
 - Flavor
- Separate feeding of protein concentrate and carbohydrate
 - Particle size should match
 - Mash will be left otherwise

Nutrients

- Carbohydrates
- Fats
- Proteins
- Vitamins
- Minerals
- Water

Carbohydrates: Energy Source

- Carbohydrates are sources of simple sugars
 - Cereal Grain Sources (Most Common)
 - Corn
 - Sorghum (Milo)
 - Wheat
 - Barley (low)
 - Rye (low)
- Milk sugars
 - Lactose which cannot be used by the chicken due to the fact that they lack the enzyme Lactase
- Forages that contain large portions of cellulose and other complex carbohydrates are of little value to chickens

Feed Ingredients: Carbohydrate Sources

- Corn (Major cereal source)
 - Potential Mycotoxin Contamination
 - Skin/egg yolk color
- Wheat (Commonly used as an energy source)
 - Beak impaction
 - Wetter litter

Feed Ingredients: Carbohydrate Sources

- Barley
 - Used substantially in European poultry diets
 - Moderate energy, fed with higher fat levels
 - β -glucan (Utilize enzyme)
- Rye
 - Complex carbohydrates (Wet and sticky droppings)
 - ergot contamination

Feed related to Energy Consumption

- Daily energy requirements increase as birds age
- Daily energy requirements per lb of body weight decrease as the birds age
- Within limits the energy value of the feed affects the amount consumed
- There is little difference between male and female caloric requirements

Feed related Energy Consumption Effects

- Decreased energy results in a pause in production at peak
- Decreased energy results in increased feed consumption
- Decreased energy results in poorer feed conversions

Fats: Energy Source

- Fat
 - Animal Fats are typically saturated and are solid at room temperatures
 - Beef Tallow
 - Lard
 - Poultry Fats are semi solid at room temperatures
 - Vegetable Fats are liquids at room temperature and are good sources of the Essential Fatty Acids
 - Corn Oil
 - Soybean Oil
 - Safflower Oil

Feed Ingredients: Fats

- Tallow
 - Solid at room temp
 - Rancidity
 - Poor digestibility in young birds
- Poultry fat
 - Best source due to Fatty acid profile
 - Rancidity
- Vegetable oils
 - Ideal ingredients for young birds (8700 kcal/kg)
 - Rancidity

Fats: Energy Consumption

- Essential Fatty Acids
 - Linoleic Acid
 - Arachidonic Acid
- Fats
 - 2.25 times more energy than carbohydrates
 - Up to 3 to 6 % can be added
- Fat availability
 - Type of fat
 - Age of bird
 - Type of diet
 - Amount fed
 - Fat composition (FFA, Saturation, and Purity)

Feed: Protein Source

- Proteins are made up of building blocks Amino Acids
 - Feeding for Amino Acid intake
 - First Limiting AAs
 - Lysine
 - Tryptophan
 - TSAA
 - » Methionine
 - » Cystine
 - Remember that birds also must have a certain amount of non-specific amino acids for protein synthesis
- Birds are omnivores

Feed: Protein Source

- Sources of proteins include both vegetable and animal sources which have been in use for 100s of years
 - Vegetable Sources
 - Soybean Meal
 - Sunflower Meal
 - Animal Sources
 - Meat Meal
 - Fish Meal
 - Milk products
 - By-Product Sources
 - Brewers Solubles
 - Milling By-Products

Feed Ingredients: Plant Proteins

- Soybean Meal
 - Standard vegetable protein which others are compared
 - Trypsin Inhibitor
- Sunflower meal
 - Grown in cooler climates
 - Low energy
 - Low Lysine

Feed Ingredients: By-product meals

- Meat meals
 - Concentrated source of Amino Acids
 - Variable Ca:P levels
- Fish Meals
 - Limited use due to flavors
 - Oxidative rancidity
 - Unidentified growth factor

Feed: Protein Consumption

- Total protein is not the most important
- Daily needs for individual amino acids is critical
- Theoretical protein levels in diets
- Dual Purpose Breeds
 - Pre-lay feed 21%
 - Peak feed 21%
 - Post-peak feed 20%
 - Mid-cycle feed 18%
 - Late cycle feed 15%

Feed: Protein Consumption

- Grams of protein consumed per bird increases as the birds age
- Grams of protein consumed per gram of body weight decreases as the birds age

Feed: Protein Consumption

NRC Amino Acid Requirements

Amino Acid	Starter	Grower	Finisher
	%	%	%
Arginine	1.00	0.83	0.67
Lysine	0.85	0.60	0.45
Methionine	0.30	0.25	0.20
TSSA	0.62	0.52	0.42

Feed: Vitamin Consumption

- Compounds not synthesized by the body but are involved as coenzymes and metabolic regulation
 - Fat soluble Vitamins
 - A
 - D
 - E
 - K
 - Water soluble Vitamins (all the rest)
 - Thiamin
 - Riboflavin
 - Etc.

Feed: Vitamin Consumption

NRC Recommendations

Vitamin	Age of Laver in weeks	
	0-18	18 to 80
Vit A	1500 IU/kg	3100 IU/kg
Vit D ₃	200 IU/kg	320 IU/kg
Vit E	10 IU/kg	5 IU/kg
Vit K	0.5 mg/kg	0.5 mg/kg
Thiamin	1.0 mg/kg	0.75 mg/kg
Biotin	0.15 mg/kg	0.10 mg/kg
Choline	1300 mg/kg	1100 mg/kg

Feed: Mineral Consumption

- Structural Component as well as involvement in metabolic functions
- Divided into two classes
 - Macro Minerals
 - Calcium
 - Phosphorus
 - Sodium
 - Potassium
 - Magnesium (etc.)
 - Micro Minerals
 - Selenium
 - Zinc (etc.)

Feed: Mineral Consumption

NRC Recommendations

Mineral	Age of Layers in Weeks	
	0-18	18 to 80
Calcium (%)	0.85	3.25
Total Phos (%)	0.65	0.57
Avail Phos (%)	0.35	0.25
Salt (%)	0.35	0.35
Sodium (%)	0.15	0.15
Potassium (%)	0.25	0.15

Feed: Other Dietary Supplements

- Pro-biotics
 - Disease prevention
 - Gut Physiology
 - Gut Microbial Populations
- Coccidiostat
 - Prevention of Coccidiosis
- Antioxidant
 - Prevents breakdown of vitamins and fat rancidity
 - Prevents appearance of encephalomalacia
- Xanthophylls
 - Enhances pigment of the yolk
 - Alfalfa meal
 - Marigold petal meal

Feed Ingredient Pullet Rearing

Ingredient	Minimum Usage	Maximum Usage
Corn %	20	70
Wheat %		20
Barley %		20
Rye %		5
SBOM %	10	30
SFM %		15
Meat Meal %		10
Fish Meal %		8
Tallow %		2
Poultry Fat %	1	5
Veg Oil %	1	5

Feed Ingredient Older Poultry

Ingredient	Minimum Usage	Maximum Usage
Corn %	20	60
Wheat %		20
Barley %		15
Rye %		5
SBOM %	10	25
SFM %		15
Meat Meal %	2	7
Fish Meal %		5
Tallow %	1	5
Poultry Fat %	1	5
Veg Oil %	1	8

Corn/Wheat/Barley/SBM/SFM Layer Diet

Ingredient	Composition (%)
Corn	15.00
Barley	5.00
Wheat	27.42
Soybean Meal	15.48
Sunflower Meal	15.59
Vegetable Fat	7.26
Fish Meal	2.50
D-L Methionine	0.01
Mold Inhibitor	0.10
Calcium Carbonate	9.21
Di-Calcium Phos.	1.28
Salt/Sodium Bi-Carb	0.68
Vitamin Premix	0.10
Mineral Premix	0.05
Choline	0.32

Corn/Wheat/Barley/SBM/SFM Layer Diet

Nutrient	Composition (%)
Protein	21.00
Crude Fat	10.00
Calcium	4.00
Phos. Total	0.74
Phos. Available	0.40
M.E. Poultry	2925 kcal/kg
Methionine	0.53
Cystine	0.37
Lysine	1.10
Arginine	1.59
Meth/Cys	0.90
Choline	2860 mg/kg
Sodium	0.29

Range Management

- Maintenance of the range is important as it is in other grazing species.
 - Maintenance of the forages
 - Optimal nutrient values
 - Continuous seasonal availability
 - Range rotation
 - Shade for the birds

Husbandry Recommendations: Layer

- Area per hen
 - Range facilities
 - 1.0 to 1.5 ft²/hen in range house
 - 173 to 86 ft²/hen on the range (Year round access)
- Range rotation
 - Recommended crops (Ladino Clover, Rye, Blue grass, etc)
 - Maintain a mixed stand with mowing to enhance new growth
- Range population/acre
 - 250 – 500 hens/acre recommended
 - 1000 hens/acre for single seasons only

Husbandry Recommendations: Layer

- **Feed consumption**
 - Diets composed of cereal grains, plant proteins, animal by-products, balanced minerals, and vitamins (wanted 25% of the protein from animal origin)
 - 15.3 g protein/hen/day (15-17 %CP)
 - Developments in forage management improved flock performance and reduced labor (Clovers, grasses, alfalfa)

Laying Hen Performance

- **Commercial Breeds**
 - 240 eggs/hen/year
 - 3.5 lb./doz.
 - 14.1 % mortality
- **Heritage breeds**
 - 167 eggs/hen/year
 - 6.9 lb./doz.
 - 20.6 % mortality

Husbandry Recommendations: Turkey

- **Area per hen**
 - Range facilities
 - 433 ft²/bird on the range
- **Range rotation**
 - Recommended crops (Ladino Clover, Rye, Blue grass, etc)
 - Maintain a mixed stand with mowing to enhance new growth
 - Move feeders and water sites regularly
- **Range population/acre**
 - 100 birds/acre recommended

Husbandry Recommendations: Turkey

- **Feeders**
 - Trough or Hopper style feeders
 - Feed must be protected from adverse weather
 - Must be adjustable in height
 - 6 in. of feeder space per bird
- **Waterer**
 - Newly Hatched Poults: 1 gal/ 50 poults
 - Consumption increases 10-15% weekly

Husbandry Recommendations: Turkey

- **Feed consumption**
 - Diets composed of cereal grains, plant proteins, balanced minerals, and vitamins
 - 32 % protein content starter
 - 26% Protein grower
 - Developments in forage management improved flock performance and reduced labor (Clovers, grasses)

Forages for Range

- Forages provide a portion of the nutrient requirements to birds in their early growth phases when the succulent portion of the plants are growing.
- They provide vitamins, proteins, minerals, and xanthophylls which would have to be supplemented in the diet by other means under other husbandry practices.

Range Management: Maintenance of the forages

- Optimal nutrient values of forages
 - Young plants
 - Tender, and succulent
 - Low in fiber which enhances digestability
 - Continuous seasonal availability
- Range rotation
- Shade for the birds
 - This can be larger plants which will produce seeds later in the year
 - Sunflower, Okara
 - Artificial

Range Management: Continuous seasonal availability

Forages	Crude Protein (%)	Crude Fiber (%)
Bermuda Grass	4.4	8.3
K. Blue Grass	5.2	8.1
Orchard Grass	4.3	5.8
Rye Grass	3.5	5.8
Alfalfa	4.3	4.9
Crimson Clover	3.1	5.0
Ladino Clover	5.3	2.7
Lespedeza	5.2	13.5

(Swanson and Herman, 1942); (Dearstyn and Kim, 1943); (Feeds and Feeding 4th ed 1987)

Range Management: Growing season availability

Forages	J	F	M	A	M	J	J	A	S	O	N	D
Bermuda Grass												
K. Blue Grass												
Orchard Grass												
Rye Grass												
Alfalfa												
Crimson Clover												
Ladino Clover												
Lespedeza												

(Dearstyn and Kim, 1943); (MU Dept of Agronomy web)

Range Management: Range Rotation

Range A: Orchard Grass
Lespedeza
Alternating with B
Until late spring

Range B: Rye Grass,
Crimson Clover
Alternating with A

Range House

Range C: Alfalfa or Bermuda Grass
Mid Year Foraging

Range Management: Range Shade
