

U.S. CRICKET FEED ANALYSIS

REPORT PREPARED FOR:

[Redacted]

SEPTEMBER 30, 2016

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Executive Summary

If using conventional feed, we recommend using Purina's Cricket Chow, based on our industry expertise. Purina has a high bar for quality testing and also has a wide product distribution. Purina's Cricket Chow is used by cricket farmers throughout the U.S. and is often amended to create proprietary feed blends. If purchasing less than two tons, it is best to order for fulfillment at the feed outlet closest to the target city and pick the feed up with a box truck from there.

For organic feed, we recommend Nature's Grown Organics Cricket Feed. This is a good quality feed milled out of Westby, Wisconsin. They are close to the target states requested (Michigan, Illinois, Iowa). Based on anecdotes from multiple farmers, there is a slightly slower growth curve (~2-4 days over a full lifecycle), and a slightly higher cannibalism rate. Supplementing this feed with an animal protein source is recommended and may mitigate these issues.

Our third recommendation is to purchase a custom feed formulation made by BioForge Labs. This custom feed will not be organic but can be formulated from non-GMO ingredients and customized to user specifications.

Coyote Creek Farms also makes an organic cricket feed with an impressive formulation,. However, we hesitate to recommend it at this time because it has not been adequately tested and is fairly new to the market. Although promising, we suggest establishing a farm with one of our recommended feeds and testing the cricket feed made by Coyote Creek Farms against more established feeds.

Lone Star Feed and Fertilizer produces a standard inexpensive cricket feed, however, this feed is not rated for edible insects. If you are interested in using this feed, it would require separate testing (pathogenic, heavy metals, etc.) before use. Additionally, due to geographic distance, you would need to arrange transshipment for fulfillment and would likely need to order by the truckload.

Regardless of the feed you choose, amending your feed of choice is highly recommended. Standard cricket feeds tend to be lower in nutrient content than feeds formulated for laboratory studies (Morales-Ramos, 2016). Additionally, digestible nutrient fractions reported in published studies are derived from values based on ruminants and horses, making their applicability to crickets imprecise at best.

Detailed Experience-Based Reviews

IMPORTANT: THE FOLLOWING CONTAINS UNSUBSTANTIATED CLAIMS.

Recommended Feeds

Purina/Mazuri Cricket Chow

Big Cricket Farms has used Mazuri's formulation, which is sold under the Purina brand as Purina's Cricket Chow. Most cricket farmers in the U.S. have experience using this feed formulation as well. The Purina/Mazuri feed is widely regarded as the industry standard by traditional cricket farmers throughout the U.S. However, most farmers supplement this feed along with other commercially available feeds in some way or another, with variable results. This feed comes highly recommended based on anecdotes from farmers.

In the late summer through early fall of 2012-2013, and as late as 2014, cricket farmers using the Purina/Mazuri formulation claim to have suffered unexpectedly high mortality rates and shorter wing-span on adult crickets, which prevented breeding. One farmer we spoke to claims to have lost \$100,000 worth of crickets in the summer of 2013 alone.

Based on testing results and side-by-side comparisons, we were told the feed in question was manufactured at Purina's Shreveport, Louisiana facility.

Representatives from Purina's new facility (see below) have quietly admitted there may have been a mix-up and medicated feed chaff may have made its way into the cricket feed. Alternatively, there may simply have been a high seasonal pesticide load in the grain feedstock that made its way into the Purina feed.

In May 2015, Purina opened a Level 2 bio-control feed mill for their exotic pet feeds, including Purina Cricket Chow. This new facility manufactures only non-medicated, ionophore-free feeds. If you decide to use Purina's Cricket Chow, we recommend making sure it is sourced from Purina's Richmond, Indiana feed mill.

An added bonus to ordering from Purina is that they currently have the best deal on shipping: when buying two tons or more at a time, Purina will ship this feed to you for free. If you're ordering less, we recommend using Purina's **retailer finder** (<http://www.mazuri.com/wheretobuy.aspx>) to have the feed shipped to the nearest Tractor Supply or other feed store and picking it up from there. While there is a minimum bulk order, 50-lb sack samples can also be purchased directly through Mazuri's website.

Nature's Grown Organics

Big Cricket Farms has previously used Nature's Grown Organics Cricket Feed, as have other farmers. Based on our experience, this is a decent quality feed. Based on farmer anecdotes, crickets reared on this feed take a little extra time to complete their lifecycle (56 days instead of 52). That being said, we have always had good growth rates when rearing our crickets on this feed.

Nature's Grown Organics Cricket Feed formulation was developed under the direction of Dr. Aaron Dossey. This feed formulation is vegan, so we highly recommend using animal-based and/or yeast protein as an amendment. Nature's Grown Organics Cricket Feed is manufactured by Premier Co-op in Westby, Wisconsin. We recommend contacting Premier Co-Op (contact information provided in Appendix C) to ensure the feed has been ground into a fine powder, otherwise you may receive a chunky feed that is less accessible for the crickets to feed on. This cricket feed has a minimum order of one ton, and a lead time of at least two weeks is preferred by the manufacturer.

Coyote Creek Organic Cricket Feed

Coyote Creek's Organic Cricket Feed was originally formulated for a cricket farmer who never actually purchased it. To our knowledge, this feed has been manufactured and tested in small quantities, but never at scale. This feed is shipped in 500, 1,000, and 2,000 lb. super sacks. Ordering by the truckload is possible, but the pricing for this has not been worked out. In order to use this feed, you will need a silo or other bulk storage/use facility. Keep in mind there are continual maintenance costs associated with feed silos. Because rats and other rodents can make their way into the silo, cleaning between uses is of paramount importance.

Coyote Creek is excited and eager to work with cricket farms, but their distribution is limited, therefore finding a cheap shipping solution is difficult. They are projected to open a second mill in Macon, GA, however, the same shipping limitations will likely apply. If certified organic and non-GMO is of particular important, Coyote Creek's Organic Cricket Feed may be worth investigating further, as their pricing ranges from \$0.54/lb. to \$0.46/lb., which is comparable to Lone Star's pricing. They can generally manufacture feed with only two days lead time, but prefer longer if you are looking for large or recurring orders.

BioForge Labs

BioForge Labs is best known for developing proprietary feed blends for individual cricket farms. They make custom lines based on user specifications on pricing, nutrient density, and composition. BioForge Labs is also willing to work to develop custom flavored feeds.

Brent Seegers, owner and head research scientist at BioForge Labs, has been working with exotic feeds for 18 years, and cricket feed for 14 years. BioForge is best known for their semi-moist feed line for pinheads. It requires refrigeration, but is used by many breeders throughout the industry to reduce mortality amongst pinheads. A little bit of this particular formulation goes a long way.

Big Cricket Farms has a custom formulation line with BioForge, and it has given us excellent results! Pricing is comparable to other feeds on the market. It is important to note, the feed prototyping process does take a significant amount of time, quality data recording, and effort.

Rejected Feeds

Lone Star Feed

Lone Star Cricket and Worm Feed is made by Texas Farm Products Co. Lone Star Cricket and Worm Feed is *not* recommended. This feed is explicitly intended to feed insects raised for bait. Since the guts of fish are not consumed, Lone Star is exempt from testing for heavy metals. This feed may be used, but it *must* be tested for heavy metals, pesticides, and pathogens prior to use. Even then, you may be on shaky ground with regulators. Another downside to using Lone Star Cricket and Worm Feed is they can only deliver in a 250-mile radius. In order to use this feed, transshipment would need to be arranged.

Slightly Nutty

Slightly Nutty was the first company to deliver sole-ration cricket feed derived entirely from post-consumer food waste and organic grocery store cast-offs. Although this product had great potential, the founder of Slightly Nutty, Tyler Isaac, closed shop in 2016, and now works at the Monterey Bay Aquarium. To our knowledge, the feed formulation was never purchased by another entity and may be available for sale.

Homestead Organic Feed

Although the cricket feed made by Homestead Organic is both organic and favorably priced, we cannot recommend it. Feed manufactured through their facility has tested positive for the cricket densovirus in the past, and based on viral risk alone, we do not recommend them as a feed source.

Additional Feed Information

Insects can consume a wide variety of biomass compared to vertebrate livestock, such as cattle and pigs. Despite this, there are practical limitations to what types of feeds and amendments may be used to produce food-grade crickets. Some cricket farmers formulate their own artificial feed mixtures but most will add amendments to readily available commercial chicken or cricket feed.

Chicken Feed

When using chicken feed for crickets, we recommend using at least an 18% egg layer mash because it contains adequate calcium and protein for rearing healthy crickets and has a ground texture that is readily accessible to crickets. Poultry feeds also come as compressed mash that is molded into pellets. Unlike mash, pellets are often too large for crickets to feed on easily. Crumbles are pellets that have been sent through rollers to break them into granules. Feed that comes as crumbles must also be broken down physically before it is as accessible to crickets as mash.

Scratch grain (or scratch feed) consists of one or more varieties of whole, cracked, or rolled grains. Scratch grains are often scattered on the ground for poultry and consist of larger particle sizes. Because they consist only of grains, scratch grains are not a balanced ration and are used to supplement a more nutritionally complete feed. Scratch feed is *not* recommend for use as cricket feed because it contains indigestible particles, does not have a complete nutritional profile, and consists of size fractions that are not readily accessible to crickets.

Amendments

The variety of feed amendments used by farmers is as diverse as the cricket farming landscape itself. Ready-made feeds can be amended with yeast and spent grains from alcohol brewery or other ethanol production operations, for instance. Food and agricultural by-products such as dusts from cereal production, pre-consumer waste produce, or unused parts from crop production such as silage are also examples of known amendments.

There are cricket feed producers (i.e. Slightly Nutty) making cricket feed made from post-consumer wastes, and while these feeds may be suitable for crickets reared for animal consumption, they are not suitable for crickets being reared for human consumption due to differences in food quality standards.

A study done by Patton (1967) compared sixteen diet formulas and found that four diets with protein levels between 20% and 30% and carbohydrate between 32% and 47% gave the most satisfactory growth and development based upon survival, growth index, mean weight gain, conversion, and uniformity of growth. Patton eliminated ingredients across these diets for which no known insect nutritional requirement could be justified. The remaining ingredients were compiled into a list of commercially available feed amendments. These are shown along with nutritional values in Table 1 below.

Table 1. Nutritional Values of Diet Amendments. Adapted from Patton, R. L. (1967).

Amendment	Protein %	Carbohydrate %	Fat %	Vitamin A	Vitamin C	Niacin	Pantothenic acid	Riboflavin	Choline	Calcium	Copper	Iron	Manganese	Phosphorous
Alfalfa meal	14.4	26	0.9	X		X	X	X		X	X	X	X	X
Brewer's yeast, dried	40.2	35.7 ^a	1.2 ^a			X	X	X		X	X	X	X	X
Corn Meal, table quality ^c	6.8	64.1	3.5	X		X	X	X		X		X		X
Fish meal, menhaden	50.2	4.2	8.5			X	X	X		X	X	X	X	X
Liver powder ^b	76.5 ^b	6.65 ^b	—	X	X	X	X	X	X	X		X		X
Meat scrap	43.5	4.3 ^a	7.3 ^a			X	X	X		X	X	X	X	X
Milk, dried skim	31.2	46.8	1.2			X	X	X		X	X	X	X	X
Soybean meal (41%)	34.5	30.4 ^a	5.3 ^a					X		X	X	X	X	X
Wheat, mill feed	13.7	42.5	4.5			X	X	X		X	X	X	X	X

^a Total (analyzed) concentrations; figures for the digestible fractions are not listed.

^b Defatted. The values for liver powder are calculated from data for fresh pork liver.

^c Vitamin-fortified.

Citation: Patton, R. L. (1967). Oligidic diets for *Acheta domesticus* (Orthoptera: Gryllidae). *Annals of the Entomological Society of America*, 60(6), pp.1239

Table 1 shows commercially available amendments and their nutrient digestible fractions, except where noted. It is important to note, the digestible fraction reported in this study and others is based on available data on ruminants and horses, not crickets specifically; as far as we know, the digestible nutrient fraction for crickets is not known.

Feed Testing

If the feed manufacturer does not provide you with test results, it is important to get the feed tested yourself to avoid liability, particularly when rearing crickets for human consumption. The edible insect industry is a relatively new frontier and many feed manufacturers still adhere to standards that are unfit for rearing insects for human consumption. Cautions against heavy metal accumulation or the spread of pathogens must be taken seriously when rearing crickets for human consumption.

Any feed considered for rearing edible insects should be subjected to microbial testing for pathogens; this can be done on feedstocks from which the feed is produced, or on the final product by the producer of the feed. Optionally, microbial testing for pathogens can be done after receiving feed. Heavy metal and pesticide testing is recommended and should not exceed limits set by the EPA. Other tests such as viral testing (i.e. CrPV), genomic testing (if biological adulterants are suspected), and nutritional analysis (particularly for Vitamin A content) are recommended to identify potential problems as needed.

Feed Storage

Feed should always be stored in a cool ($\sim 22^{\circ}\text{C}$) and dry (approximately 50% RH) location. Most dry feeds will last up to one year, but some may be stored for as little as four months, even under optimal storage conditions. Semi-moist feeds should be refrigerated to maintain freshness and to prevent pathogens. Feed should be kept at least 6 inches off the ground, ideally on a rat-resistant surface. Dry feed purchased in 40-50 lb. bags can be sufficiently stored on pallets. When storing feed shipped in larger quantities, such as super sacks or bulk bags, a silo is recommended. It is important to note that silos pose additional costs to build and continually maintain.

Best Practices

Daily feed requirements for the facility should be measured out into feed carts on a daily basis. Feed carts should be washed on a weekly basis, ideally, and at minimum of once a month. Cricket feed should be well-blended because, like most animals, crickets are not very capable of picking and choosing their diet according to their nutrient needs. In fact, crickets left to feed on non-homogenized feed

sources are much more likely to suffer from malnutrition than crickets reared on a well-mixed diet. Blending ensures even access to nutrients, and thus increased overall quality of reared crickets at mass-scale production.

Life Cycle of *Acheta domesticus* and *Gryllodes sigillatus*

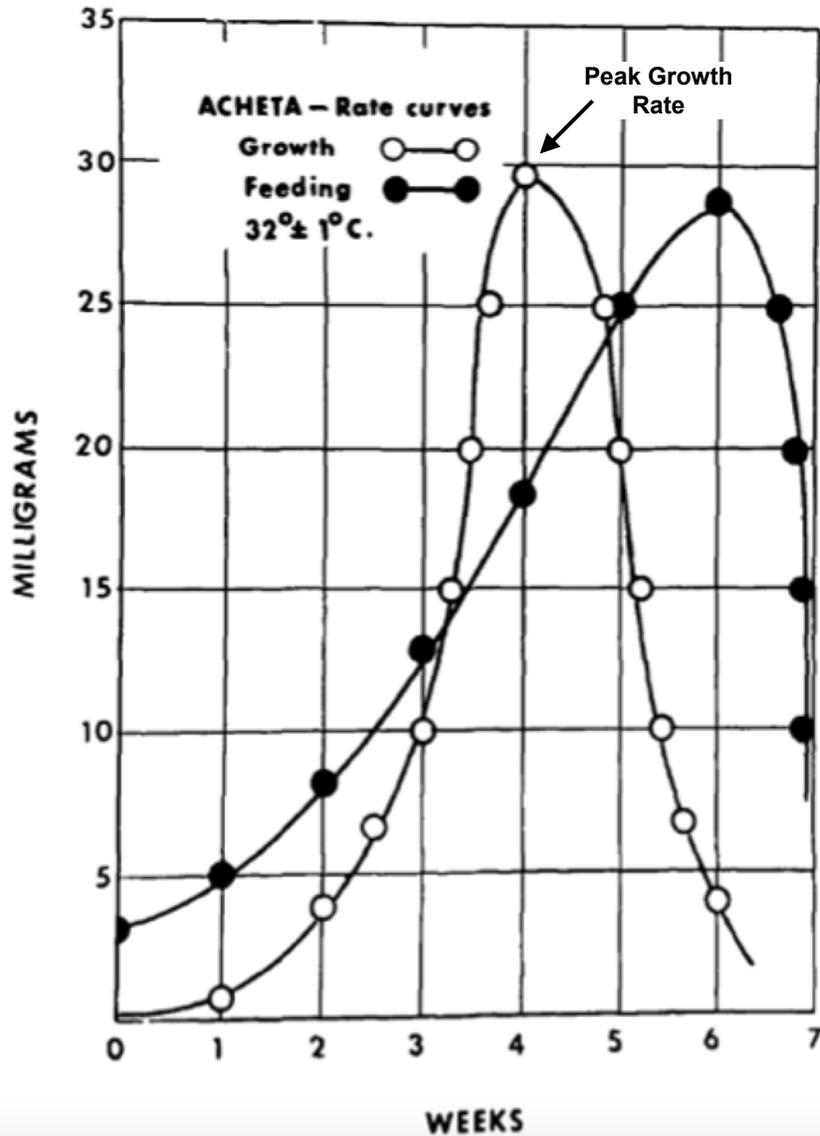
Acheta domesticus take two to three months to complete their life cycle when reared at 27 to 32°C. They have no special overwintering stage, but survive cold weather in the northern States and Canada in and around buildings and in dumps, where heat from fermentation may sustain them. Eggs are deposited in whatever damp substrate is provided - for example, sand or peat moss. Juveniles resemble the adults except for being smaller and wingless. Similarly, *Gryllodes sigillatus* have no special overwintering stage and generations are continuous. Depending on the temperature, development from egg to adult takes two to three months. Both crickets have a comparable life cycle, and possess a nearly identical nutritional profile.

Growth

Patton (1978) characterized the growth and development of *Acheta domesticus* over a period of 20 years of laboratory rearing on what was found to be an optimum¹ diet in a prior study done by Patton (1967) in which sixteen oligidic diet formulations were compared. Based on this study, Patton derived a growth curve that was compared against the quantity of feed used (Figure 1 below).

¹ Patton (1978) found the most consistent growth and development in *Acheta domesticus* with Patton's (1967) diet 16 which they refer to as the "optimum" diet. The "optimum" diet is a mixture of soybean meal, 30%; standard wheat middlings, 25%; powdered skim milk, 15% ; corn meal, 10% ; powdered brewer's yeast 10%; and powdered animal liver (NF), 10%. This "optimum" diet contained a calculated 30% protein, 37% carbohydrate, and 5% fat; and is consistent with the observation of McFarlane (1964) that this species grows best on a diet containing 20-30% protein.

Figure 1. Rate curves for growth (open circles) and feeding (closed circles). Adapted from Patton (1978).



Citation: Patton, R.L., 1978. Growth and development parameters for *Acheta domesticus*. *Annals of the Entomological Society of America*, 71(1), pp.40-42.

Figure 1 shows the peak growth rate for *Acheta domesticus* is 4 weeks when reared at 32° ± 1° C. This growth rate was determined under laboratory conditions. Growth rate is impacted by factors other than food such as temperature, humidity, as well as a slew of other variables. We find the peak growth rate to vary between 4-6 weeks.

APPENDIX A - PURINA CRICKET CHOW

Purina® Cricket Chow™

(Available at www.mazuri.com or through a Mazuri retailer)

Formula Code – 5130

Description

Purina® Cricket Chow™ is designed to be the sole diet for maintaining, breeding or growing crickets.

Features and Benefits

- Palatable - Readily eaten by crickets.

Product Form

Meal.

- 40 lb. net weight encased plastic bag

Catalog

0006572

Guaranteed Analysis

Crude protein not less than	19%
Crude fat not less than	5.0%
Crude fiber not more than	8.0%
Moisture not more than	12%
Ash not more than	9.0%

Ingredients

Ground corn, wheat middlings, ground soybean hulls, dehulled soybean meal, porcine meat meal, porcine animal fat preserved with BHA, cane molasses, fish meal (menhaden), salt, calcium carbonate, dl-methionine, magnesium oxide, choline chloride, manganous oxide, zinc oxide, ferrous carbonate, niacin, copper sulfate, calcium pantothenate, dl-alpha tocopheryl acetate (source of vitamin E), riboflavin, thiamin mononitrate, vitamin A acetate, zinc sulfate, folic acid, menadione sodium bisulfite complex (vitamin K), calcium iodate, pyridoxine hydrochloride, sodium selenite, cobalt carbonate, cholecalciferol (vitamin D₃), vitamin B₁₂ supplement.

NUTRIENTS

Protein, %	19
Arginine, %	1.2
Fat (Ether extract), %	5.0
Fiber (Crude), %	9.0
Neutral Detergent Fiber, %	27
Acid Detergent Fiber, %	11

MINERALS

Ash, %	6.8
Calcium, %	1.1
Phosphorus, %	0.80
Phosphorus (non-phytate), %	0.52
Potassium, %	1.0
Magnesium, %	0.25
Sodium, %	0.25
Chloride, %	0.37
Iron, ppm	260
Zinc, ppm	90
Manganese, ppm	75
Copper, ppm	13
Iodine, ppm	0.88
Selenium (added), ppm	0.15

VITAMINS

Thiamin, ppm	9.7
Riboflavin, ppm	7.6
Niacin, ppm	47
Pantothenic acid, ppm	15
Choline chloride, ppm	1,140
Folic acid, ppm	2.6
Pyridoxine, ppm	4.8
Biotin, ppm	0.18
Vitamin B ₁₂ , µg/kg	12
Vitamin A (added), IU/kg	12,540
Vitamin D ₃ , IU/kg	2,345
Vitamin E, IU/kg	20
Vitamin K (as menadione), ppm	0.24
Beta-carotene, ppm	0.34

APPENDIX A - LONE STAR CRICKET FEED



CRICKET AND WORM FEED

GUARANTEED ANALYSIS

Crude Protein, minimum	20.00%
Crude Fat, minimum	5.00%
Crude Fiber, maximum	9.00%
Calcium (Ca), minimum	0.80%
Calcium (Ca), maximum	1.20%
Phosphorus (P), minimum	0.60%
Salt (NaCl), minimum	0.25%
Salt (NaCl), maximum	0.75%

INGREDIENTS

Grain products, plant protein products, processed grain by-products, animal protein products, forage products, cane molasses, calcium carbonate, dicalcium phosphate, salt, DL-methionine, vitamin A acetate, vitamin D3 supplement, vitamin E supplement, vitamin B12 supplement, riboflavin supplement,

niacin supplement, calcium pantothenate, choline chloride, menadione sodium bisulfite complex, folic acid, pyridoxine hydrochloride, thiamine mononitrate, sodium selenite, biotin, manganese sulfate, zinc sulfate, ferrous sulfate, copper sulfate, calcium iodate, cobalt sulfate.

FEEDING DIRECTIONS

Feed as the sole ration to crickets and worms being raised for bait purposes.

CAUTION: Feed should be stored in a well-ventilated, dry area protected from rodents and insects. Feed is perishable. Do not feed moldy or insect-infested feed as it may cause illness or death.

NET WT. 50 lb (22.67 kg)
402070

Manufactured By: TEXAS FARM PRODUCTS COMPANY, P. O. Box 630009, Nacogdoches, TX 75963-0009, 936-554-3711

ME	1223.15 Kcal/lb
PROTEIN	20.10 %
ARGININE	1.31 %
GLYCINE	1.02 %
SERINE	0.97 %
HISTIDINE	0.50 %
ISOLEUCINE	0.98 %
LEUCINE	1.75 %
LYSINE	1.12 %
METHIONINE	0.36 %
CYSTINE	0.28 %
PHENYLALANINE	0.89 %
TYROSINE	0.84 %
THREONINE	0.78 %
TRYPTOPHAN	0.25 %
VALINE	1.12 %
FAT	5.06 %
LINOLEIC ACID	1.41 %
FIBER	4.84 %
CALCIUM	1.06 %
TOTAL PHOSPHORUS	0.76 %
AVAILABLE PHOS.	0.38 %
POTASSIUM	1.10 %
CHLORINE	0.37 %
COBALT	0.23 mg/lb
IODINE	0.62 mg/lb
IRON	104.06 mg/lb
MAGNESIUM	0.32 %
MANGANESE	61.42 mg/lb
SODIUM	0.25 %
SULFUR	0.20 %
COPPER	4.22 mg/lb
SELENIUM	0.19 mg/lb
ZINC	40.42 mg/lb
BIOTIN	0.18 mg/lb
CHOLINE	716.72 mg/lb
FOLIC ACID	1.00 mg/lb
NIACIN	49.57 mg/lb
PANTOTHENIC ACID	10.89 mg/lb
PYRIDOXINE	4.57 mg/lb
RIBOFLAVIN	3.44 mg/lb
THIAMINE	3.74 mg/lb
VITAMIN A	6.37 KIU/lb
VITAMIN D3	1.25 KIU/lb
VITAMIN B12	7.45 mcg/lb
VITAMIN E	19.55 IU/lb

APPENDIX A - LONE STAR 20% EGG LAYER MASH



20% LAYING MASH PELLETS

A high protein, pelletized laying ration designed to be fed along with scratch grain



Features

- * 20% protein
- * Pelletized
- * Balanced vitamins, minerals, and amino acids
- * High calcium!

Benefits

- * Increased egg production
- * Less feed is wasted
- * Harder egg shells
- * Additional protein allows use of scratch grains

Product Data

ME	893.29	Kcal/lb
PROTEIN	20.09	%
ARGININE	1.42	%
GLYCINE	1.16	%
SERINE	1.02	%
HISTIDINE	0.49	%
ISOLEUCINE	0.89	%
LEUCINE	1.54	%
LYSINE	1.09	%
METHIONINE	0.35	%
CYSTINE	0.28	%
PHENYLALANINE	0.83	%
TYROSINE	0.72	%
THREONINE	0.72	%
TRYPTOPHANE	0.24	%
VALINE	1.03	%
FAT	3.04	%
LINOLEIC ACID	1.07	%
FIBER	7.36	%
CALCIUM	3.71	%
TOTAL PHOSPHORUS	0.72	%
AVAILABLE PHOS.	0.41	%
POTASSIUM	1.05	%
CHLORINE	0.36	%
COBALT	0.23	mg/lb
IODINE	0.66	mg/lb
IRON	68.67	mg/lb
MAGNESIUM	0.42	%
MANGANESE	73.49	mg/lb
SODIUM	0.28	%
SULFUR	0.22	%
COPPER	4.92	mg/lb
SELENIUM	0.19	mg/lb
ZINC	49.49	mg/lb
BIOTIN	0.12	mg/lb
CHOLINE	703.71	mg/lb
FOLIC ACID	0.66	mg/lb
NIACIN	29.42	mg/lb
PANTOTHENIC ACID	9.23	mg/lb
PYRIDOXINE	2.90	mg/lb
RIBOFLAVIN	2.93	mg/lb
THIAMINE	3.06	mg/lb
VITAMIN A	3.68	KIU/lb
VITAMIN D3	1.25	KIU/lb
VITAMIN B12	4.85	mcg/lb
VITAMIN E	10.37	IU/lb

Ingredients

Grain products, plant protein products, processed grain by-products, roughage products (10%), forage products, cane molasses, calcium carbonate, salt, DL-methionine, vitamin A acetate, D-activated animal sterol (source of vitamin D3), vitamin E supplement, vitamin B12 supplement, riboflavin supplement, niacin supplement, calcium pantothenate, choline chloride, menadione sodium bisulfite complex, folic acid, pyridoxine hydrochloride, thiamine mononitrate, sodium selenite, biotin, manganese sulfate, zinc sulfate, ferrous sulfate, copper sulfate, calcium iodate, cobalt carbonate.

Guaranteed Analysis

Crude Protein, min	20.00%
Lysine, min	0.75%
Methionine, min	0.35%
Crude Fat, min	3.00%
Crude Fiber, max	8.00%
Calcium (Ca), min	3.40%
Calcium (Ca), max	4.40%
Phosphorus (P), min	0.60%
Salt (NaCl), min	0.25%
Salt (NaCl), max	0.75%

Feeding Directions

Feed free choice to chickens 18 weeks of age or older from time first egg is laid throughout the time of egg production. In addition to this feed, up to 8 pounds of Lone Star Hen Scratch per 100 birds may be fed daily. Keep feeders clean and provide a source of fresh, clean water at all times.

CAUTION: Changes in feed should be made gradually. Feed should be stored in a well-ventilated, dry area protected from rodents and insects. Feed is perishable. Do not feed moldy or insect-infested feed as it may cause illness or death.

APPENDIX A - COYOTE CREEK ORGANIC

Coyote Creek Organic Feed Mill

COYOTE
CREEK
ORGANIC
FEED MILL



APPENDIX A - NATURES GROWN ORGANICS



ORGANIC CRICKET FEED MEAL- 001230

CAUTION: USE ONLY AS DIRECTED

GUARANTEED ANALYSIS

CRUDE PROTEIN(Min).....	19.00%
CRUDE FAT (Min).....	5.00%
CRUDE FIBER(Max).....	9.00%
MOISTURE(Max).....	12.00%
ASH(Max).....	8.50%
CALCIUM(Ca)(Min).....	0.77%
CALCIUM(Ca)(Max).....	1.27%
PHOSPHORUS(P)(Min).....	0.75%
SODIUM(Na)(Max).....	0.51%

INGREDIANTS

Organic Soybean Meal, Organic Wheat Middlings, Organic Corn, Organic Barley, Organic Oats, Calcium Carbonate, Organic Cane Molasses, Organic Soybean Oil, Monocalcium Phosphate, Dicalcium Phosphate, Salt, DL-methionine, Choline Chloride, Vitamin E Supplement, Riboflavin Supplement, Menadione Dimethylprimidinol, Bisulfite (source Of Vitamin K) Iron Oxide, Zinc Oxide, Vitamin B-12 Supplement, Vitamin A Supplement, Vitamin D3 Supplement, Niacin Supplement, Calcium Pantothenate, Folic Acid, Thiamine Mononitrate, Pyridoxine Hydrochloride, Sodium Selenite, Copper Sulfate, Ethylenediamine Dihydroiodide, Iron Sulfate, Magnanous Oxide, Zinc Methionine Complex, Sodium Sulfate.

513A-YWB-W 2

DIRECTIONS:

FEED AS A SOLE RATION TO GROWING CRICKETS

CAUTION:

Store in a dry, well-ventilated area protected from rodents and insects. Do not feed moldy or insect-infested feed to animals as it may cause illness, performance loss or death.

NOT FOR RESALE



* 04273 04106 *

Manufactured By:

Premier Cooperative

405 South Main Street, Westby, WI 54667

Net Weight 50 Lb (22.67 Kg)

Certified Organic By: Midwest Organic Services Association Inc.

10/2014

APPENDIX A- NATURES GROWN ORGANICS

18% EGG LAYER



ORGANIC LAYER 18%

(PHASE 1)

COMPLETE FEED FOR LAYING CHICKENS

GUARANTEED ANALYSIS

Crude Protein, Not less than.....	18.0%
Lysine, Not less than	0.60%
Methionine, Not less than.....	0.35%
Crude Fat, Not less than.....	5.0%
Crude Fiber, Not less than	5.0%
Calcium (Ca), Not less than.....	3.5%
Calcium (Ca), Not more than.....	4.5%
Phosphorus (P), Not less than.....	0.60%
Salt (NaCl), Not less than	0.3%
Salt(NaCl), Not more than.....	0.8%

INGREDIENTS

Organic Soy, Organic Corn, Organic Barley, Organic Oats, DL-Methionine, Zinc Methionine Complex, Organic Soy Oil, Organic Flax Meal, Organic Wheat Midds, Calcium Carbonate, Salt, Monocalcium Phosphate, Dicalcium Phosphate, Ferrous Sulfate, Manganous Oxide, Zinc Oxide, Copper Sulfate, Iron Oxide, Ethylenediamine Dihydriodide, Sodium Selenite, Folic Acid, Vitamin D3 Supplement, Vitamin A Supplement, Choline Chloride, Niacin, Vitamin E Supplement, Vitamin B12 Supplement, Calcium Pantothenate, Riboflavin, Pyridoxine Hydrochloride, Thiamine, Menadione Dimethylpyrimidinol Bisulfite.

DIRECTIONS FOR USE

Feed as the sole ration to laying hens from onset of egg production (18-20 wks. of age). Natures Grown Organic Layer 18% is especially recommended for feeding to young layers during periods of very hot temperatures or low feed intake, e.g., less than 20 lbs. per hundred birds per day. May be used during the entire production cycle. Do not provide additional grain or free-choice calcium source.

Provide fresh clean water at all times.

Manufactured By:

Premier Cooperative

405 S. MAIN STREET, Westby WI 54667

Certified Organic by Midwest Organic Services Association

APPENDIX A- NATURES GROWN ORGANICS
18% EGG LAYER SOY FREE



NO SOY PELLETS
ORGANIC LAYER 18%
(PHASE 1)
COMPLETE FEED FOR LAYING CHICKENS
GUARANTEED ANALYSIS

Crude Protein, Not less than	18.0%
Lysine, Not less than	0.60%
Methionine, Not less than.....	0.35%
Crude Fat, Not less than.....	5.0%
Crude Fiber, Not less than	5.0%
Calcium (Ca), Not less than	3.5%
Calcium (Ca), Not more than.....	4.5%
Phosphorus (P), Not less than.....	0.60%
Salt (NaCl), Not less than	0.3%
Salt(NaCl), Not more than	0.8%

INGREDIENTS

Organic Grain Products, Organic Flax Meal, Organic Wheat Midds, Sea Kelp, Methionine Supplement, Calcium Carbonate, Salt, Monocalcium/Dicalcium Phosphate, Ferrous Sulfate, Manganous Oxide, Zinc Oxide, Copper Sulfate, Iron Oxide, Ethylenediamine Dihydriodide, Sodium Selenite, Folic Acid, Vitamin D3 Supplement, Vitamin A Supplement, Choline Chloride, Niacin, Vitamin E Supplement, Menadione Sodium Bisulfite Complex, Vitamin B12 Supplement, Calcium Pantothenate, Riboflavin, Biotin, Pyridoxine Hydrochloride, Thiamine.

APPENDIX B - MIDWEST DISTRIBUTOR MAP

Interactive distributor map can be found at the following [link](#).

<https://drive.google.com/open?id=13zytllfhVQIPedP2Ez5M7D-5duY&usp=sharing>

Feed Manufacturers

- 📍 Premier Co-op
- 📍 Land O'Lakes Purina Feed
- 📍 Bioforge Labs
- 📍 Texas Farm Products Co
- 📍 Coyote Creek Farm
- 📍 Future Site of Coyote Creek's second mill
- 📍 Homestead Organics Ltd ****Rejected!****



APPENDIX C- FEED MANUFACTURER CONTACT LIST

Feed Type	Type	Contact	Title	Phone	Email	Location
Purina-Mazuri Cricket Chow	Standard	Debbie Hoffman	Midwest Manager	651-375-6396	mazuri@purina-mills.com	Richmond, IN
Natures Grown Organics	Organic	Charlie Fisher	Nutritionist	608-634-7309	cjfisher@landolakes.com	Westby, WI
Natures Grown Organics	Organic	Ed Achenbach	Manager	608-634-7309	ed.achenbach@premiercooperative.com	Westby, WI
Coyote Creek Organic Feed Mill	Organic	Mark Vanderhoek	Sales Specialist	512-285-2556	mark@coyotecreekfarm.com	Elgin, TX
Bioforge Labs	Custom	Brent Seegers	Owner	319-230-5225	bseegers@bioforgelabs.com	Huxley, IA
*Lone Star Feed & Fertilizer	Standard	Joe Bob Stewart	VP of Feed	936-560-8236	jbstewart@texasfarm.com	Nacogdoches, TX
*You would have to have the appropriate testing done on this feed before it could be used to rear edible insects!						
Rejected Feeds	Type	Reason				
Slightly Nutty	Food Waste	Out of Business				
Homestead Organic	Organic	Virus risk				

Citations

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Patton, R.L., 1967. Oligidic diets for *Acheta domesticus* (Orthoptera: Gryllidae). *Annals of the Entomological Society of America*, 60(6), pp.1238-1242.

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