

# Crop Profile for Poultry (Broilers) in California

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## General Production Information



### Broiler Facts USA:

Three types of meat chickens are produced in the poultry industry: broilers, roasters, and game hens. Broilers fall into the middleweight group (see Table 1). The broilers are slaughtered at an appropriate age to meet these weight requirements (usually between 6 and 8 weeks).

Figure 1. Vertical Integration – Broiler Industry\*

\*Source – United States Department of Agriculture (USDA)

The production and care of broilers has evolved over time because of scientific research and through the experience of practitioners in the broiler industry. This is a labor-intensive industry because broilers require constant attention and care from knowledgeable and experienced people.

Volume production is required because of the low profit margin. Therefore, it is imperative that the grower be aware of the factors that can adversely and positively affect broilers.

Table 1. Poultry Weight Chart\*

Type of Poultry	Live Weight lbs.	Age at Slaughter
Cornish Game Hens	1.2 – 3.1	3-5 wks

Broilers	4.0 – 6.3	6-8 wks
Roasters	7.4 – 10.0	9-12 wks

\*Source – North, 1990

### Leading Broiler Production States:

Top broiler production states include Georgia, Arkansas, Alabama, Mississippi, North Carolina, and Texas. One hundred forty six million broiler chicks were placed in grow out facilities during the week ending May 22, 1999. This was a 3% increase from the same a year ago (see Table 2 for the top 15 state's broiler production during 1998).

In 1998, 7.93 billion broilers were produced in the United States. Eighty per cent of the broilers (6.36 billion) were produced in mostly southern states: Pennsylvania, Virginia, North Carolina, West Virginia, South Carolina, Tennessee, Arkansas, Georgia, Alabama, Florida, Missouri, and Texas. The remaining broilers were produced in California, Oregon, Washington, Nebraska, Oklahoma, Minnesota, Iowa, Missouri, Wisconsin, Indiana, Ohio, and Kentucky.

**Table 2. Broiler Production and Value by State and Total, 1998<sup>1</sup>**

State	Number Produced (1,000 head)	Value of Production (\$1,000)
Georgia	1,202,500	2,386,382
Arkansas	1,170,600	2,135,182
Alabama	921,800	1,806,720
Mississippi	722,400	1,369,663
North Carolina	653,000	1,418,643
Texas	480,000	842,400
Maryland	290,900	533,208
Virginia	263,300	486,563
Delaware	259,800	557,271
Missouri	255,000	416,670
California	237,300	471,978

Oklahoma	216,000	377,568
South Carolina	180,500	335,118
Kentucky	172,000	332,906
Tennessee	159,200	282,978
Other States	749,980	1,391,301
Total	7,934,280	15,144,551

<sup>1</sup>Values for California is for 1997 because no individual state data are available for 1998

\*Source – National Agricultural Statistics Service 1999

### California Production:

In 1997, California produced over 237 million broiler chickens making broilers the 13<sup>th</sup> ranked agricultural commodity in the state (Table 3). California is eleventh in the production of broiler chickens in the nation. The California poultry industry provides jobs for over 25,000 people and indirectly to tens of thousands more in affiliated industries.

**Table 3. California Broiler Production\***

Year	1,000 Head Produced	1,000 lbs. Produced	Price per lb. Dollars	Production Value \$1,000
1994	226,200	1,131,000	0.330	373,230
1995	235,800	1,179,000	0.325	383,175
1996	234,200	1,171,000	0.390	456,690
1997	237,300	1,210,200	0.390	471,978

\*Source – California Poultry Industry Federation – 1998

There is less than 10 large companies (integrators) in California that dominate the market and control all aspects of production. Some own they're own parent stock for hatching eggs, while others buy eggs from outside sources. Most integrators have their own production facilities but also contract out additional production from local growers. Contract growers provide their own grow-out facilities and labor. The integrator supplies the broiler chicks, feed, medication, vaccines and labor for bird loading and hauling.

Most Integrators prefer contracting with growers that are conveniently located nearby the integrator's processing facility.

## Cultural Practices

### Costs and Profits:

Due to the small number of integrators in the state, cost of production figures for California is not available. Feed and labor are assumed to contribute the majority of the total cost of production. Profitability is largely dependent on feed efficiency, bird livability and fuel cost. During the early 1990's, a major integrator left California, which resulted in a surplus of contract growers. Conditions improved by 1996 for local growers because the price per pound for broilers rose 18% to \$.39 per pound.

### Location within California:

Broiler production in California stretches from Sacramento in the North to Bakersfield in the South. The top producing counties are Fresno, Merced and Stanislaus (see Table 4). Poultry growers are also located in Madera and San Joaquin counties.

**Table 4 California Poultry Counties Dollar Value Gross Farm Income**

<b>County</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>
Fresno	\$355,078,000	\$420,382,000	\$375,728,000
Kings	\$18,600,000	\$30,471,000	\$29,074,000
Merced	\$165,642,500	\$255,448,000	\$170,840,000
Stanislaus	\$221,266,000	\$203,383,000	

\*Source – California Poultry Industry Federation

## General Production Management

### Breed and Strain Selection:

Broilers are genetically selected for rapid weight gain and large body size. Breeders select male and female lines with good growth-promoting characteristics. Male lines are particularly heavily fleshed, large, grow rapidly and have excellent feed conversion. Female lines are selected for large body size, good egg production and hatchability. Most male lines incorporate some genetics from the Dark or Light Cornish breed. Roasters are larger than broilers and require special lines of birds that will grow rapidly to the heavier body weight.

### Beak Trimming:

Many broiler strains are non-aggressive and do not require beak trimming. If beak trimming is necessary it is usually done at the hatchery.

### Moving Programs:

Chicks are transported from the hatchery to the grow-out farm at day of age in new disposable cardboard boxes with pads or plastic boxes that are freshly cleaned, sanitized and fitted with new pads. The boxes have a lining that provides good footing for the chicks (e.g., excelsior pads or absorbent mats) and are well ventilated. The number of chicks per box is determined by outdoor temperature and transit time.

The delivery vehicles are ventilated to control temperature and humidity and remove carbon dioxide (ventilation capacity 25cfm/1,000 chicks). Deliveries are scheduled early in the morning during hot weather to minimize heat stress. The vehicles are cleaned and sanitized after each use.

### Feeding Programs:

There are two main types of feeding programs used by the broiler industry. For lightweight broilers, two rations are fed to 7 weeks of age: a starter ration from one to twenty-one days of age followed by a grow ration from twenty-two days to market age. Heavier broilers are usually feed three rations. The starter ration is fed from one to fourteen days, the grow ration from fifteen to thirty-nine days and the finisher ration from forty to market age. If the feed is medicated, there is a three to five day withdrawal period prior to marketing to prevent residues from appearing the meat.

Broilers require a dietary composition that meets the bird's amino acid, energy and trace mineral and vitamin requirements. Typical rations that may be fed are shown in Table 5.

**Table 5 Broiler Rations\***

<b>Ingredient</b>	<b>Starter (lb.)</b>	<b>Grower (lb.)</b>	<b>Finisher (lb.)</b>
Ground yellow corn	1,106	1,238	1,282
Alfalfa meal *17% protein)	-	25	25
Soybean meal (dehulled)	605	420	370

Corn gluten meal *60% protein)	50	75	75
Fish meal (65% protein)	50	50	50
Meat/bone meal (4% protein)	50	50	50
Dicalcium phosphate	10	9	9
Ground limestone	16	14	14
DL-Methionine	0.8	-	-
Stabilized yellow grease	106	112`	115
Iodized salt	7	7	7
Antibiotic Supplement	Mfg recommended	Mfg recommended	Mfg recommended
Antioxidant	Mfg recommended	Mfg recommended	Mfg recommended
Coccidiostat	Mfg recommended	Mfg recommended	Mfg recommended
<b>Vitamins/Minerals (Units)</b>			
Vitamin A (IU)	4,000,000	4,000,000	4,000,000
Vitamin D <sub>3</sub> (IU)	1,000,000	1,000,000	1,000,000
Vitamin E (IU)	2,000	2,000	2,000
Vitamin K (mg)	2,000	1,000	1,000
Vitamin B <sub>12</sub> (mg)	12	12	12
Riboflavin (mg)	3,000	3,000	3,000
Niacin (mg)	20,000	20,000	20,000
Calcium pantothenate (mg)	5,000	5,000	5,000
Choline (mg)	503,000	672,000	672,000
Zinc (g)	30	30	30
Manganese (g)	75	75	75
Selenium (mg)	90.8	90.8	90.8
<b>Totals (lb.)</b>	<b>2,000.9</b>	<b>2,000.1</b>	<b>2,000.2</b>

\*Source – North, 1990

The market weight of broilers varies but usually reaches 4.2 lbs. in 45 days. Birds over 6.0 lbs. are usually considered to be roasters. The data in Table 6 represents average annual growth and feed consumption figures for broiler flocks.

**Table 6. Growth, Feed Consumption, Broilers in pounds (Year-round Ave. 70°F)**

Live Weight		Feed Consumption		Feed Conversion		
Wk of age	End of Wk	Wkly Gain	Week	Cumulative	Week	Cumulative
1	0.33	0.33	0.26	0.26	0.80	0.80
2	0.86	0.53	0.64	0.90	1.21	1.05
3	1.53	0.67	1.00	1.90	1.49	1.24
4	2.33	0.80	1.39	3.29	1.74	1.41
5	3.20	0.87	1.77	5.06	2.03	1.58
6	4.15	0.95	2.20	7.26	2.32	1.75
7	5.15	1.00	2.63	9.89	2.63	1.92
8	6.12	0.97	2.90	12.79	2.99	2.09

\*Source – North, 1990

**Water Sources:**

Water provided to broilers meets human portability standards. During the early days of a chick’s life, water is the most important source of nutrients. In order to prevent dehydration and for the chicks to learn where the water source is located, water at ambient temperature is provided prior to giving feed. Waters for broilers may be trough, dome-type, cup or nipple. Chicks usually drink from one water source only.

**Vaccination:**

Vaccination is necessary to protect broilers from Marek’s and other disease agents. The vaccination program is customized to protect chicks from disease agents that cause mortality on the farm in which they will be grown. Broilers are marketed at approximately 7 weeks of age, so they don’t succumb to diseases that affect older birds, therefore their vaccination programs are different from breeders or other laying chickens (Table 7).

**Table 7. Broiler Vaccination Program**

Age Vaccinated	Disease	Vaccination Method
1 day old	Marek’s	Subcutaneously

2 – 3 days old	Bronchitis	Ocular or water
2 – 3 days old	Newcastle	Ocular or water

\*Source – North, 1990

### **Lighting Programs:**

During the first week, baby chicks require a minimum light intensity of one-foot candle (10 lux). The growing broilers only need enough light to be able to see to eat and drink; the intensity of light, at the bird level, should be at 0.35 to 0.50-foot candles.

### **Housing**

#### *Environment*

Chicks must be protected from weather conditions (wind, rain, and temperature extremes) but also from natural predators and pests. They require good air quality. Appropriate housing enables the growers to supervise the flock more efficiently, guarantees improved feed conversion, and promotes good health. Grow houses can either be closed or open. Closed houses require mechanical ventilation, while open houses use a combination of natural and mechanical ventilation.

#### *Building*

Grow houses are usually simple gable insulated steel or aluminum roof buildings that are 40 to 50 feet wide 400 – 500 ft long in size. The roofs are designed to reflect the sun away from the house and the insulation minimizes radiant heat from reaching the birds from the hot roof and conserves bird heat during the winter months. They are usually capable of housing over 20,000 birds. Open houses use curtains to control air entering the sides of the building. The curtains are raised and lowered to provide an appropriate size air inlet for natural or mechanical ventilation.

Most floors are concrete so that it is easy to remove waste material and to accommodate equipment necessary to service and move the birds. In addition, a cement floor allows the grower to sanitize the building to prevent disease. Two to 4 inches of litter (shavings or rice hulls) are scattered on the floor to accommodate the new chicks.

Exhaust fans are located at the end of the building or within the building to blow air over the birds and two to four overhead fogger lines can be added to further cool the birds during hot weather.

In California the roof is usually insulated with at least an inch of rigid foam insulation. Space allowances range from .7 to 1.0 ft.<sup>2</sup> per bird depending on the season, house type, and the market age.

#### *Litter Management*

Most floors of broiler houses are concrete but some are compacted soil. Before chicks are placed in the house, the surface of the floor is covered with 3 to 4 inches of bedding material called litter. Cost, availability and its ability to absorb moisture primarily determine the choice of the litter material used. The most common materials used in California are wood shavings and rice hulls.

Ideally, litter should be completely removed from the house after every push-out (between flocks); however, because of expense

and labor this is seldom done. In most instances, litter is allowed to build up in the house for up to a year before the house is completely cleaned out. Growers remove wet and caked litter between flocks, then thoroughly stir the remaining litter before spreading 1 to 2 inches of fresh litter on top of the old. Complete litter cleanup is usually only done if the previous flock has experienced a disease problem such as coccidiosis.

Following removal from the house, the litter is stockpiled on the premise until it is sold and removed from the farm. A large proportion, if not the majority of litter is sold as a foodstuff to the ruminant industries, the remainder is applied to cropland.

## Insect Pests

The most important invertebrate pests on California broiler farms are flies (*Musca domestica* and *Fannia canicularis*), and darkling beetles (*Alphitobius diaperinus*).

**Houseflies** are a nuisance in late summer and fall and can be a serious problem. Large populations can result in nuisance complaints and most commonly occur between flocks when there are no birds in the house to consume the larvae. Good litter management is key in controlling housefly populations. Wet spots in the litter are monitored and removed to aid in the control of flies.

**Darkling Beetles**

Since Tempo (cyflthrin) insecticide has been released, darkling beetles are not as great a problem as they once were. These insects are found in the litter and outside the poultry house. They can carry numerous pathogens and are an intermediate host for poultry tapeworms.

**Control Measures for Inveterate Pests:**

Using sanitation methods such as manure management (discussed earlier), disinfecting and cleaning chicken houses and the use of pesticides control the above inveterate pests.

A recent study conducted by Hickie (et. al.) indicates how California poultry farmers manage insect infestations (see Table 8). They use a combination of insecticide sprays, fly bait, and other methods.

**Table 8. Insect Management Program**

Program	Technique/Product	% of respondents listing product or method	Pest
Insecticide Sprays	Purge III	10	House flies

	Tempo 20	50	Darkling beetles
	Permethrin	20	House flies
<b>Fly baits (all contain methomyl)</b>	Blue Streak, Golden Malrin, Stimukil	70	House flies
<b>Other Methods</b>	Fly tape, parasites, electric zappers, dry pad	30	House flies

\*Source Hickle, 1998

## Diseases

Preventative health measures are the best guardians against disease. Though today's poultry farmers vaccinate their chickens to prevent disease, they also use a combination of management practices such as cleaning and disinfection, disposal of refuse and dead birds, and biosecurity security to optimize the health of their birds.

Table 11 lists the most commonly used chemical disinfectants in the California broiler industry.

**Table 11. Chemicals used to disinfect broiler facilities**

<b>Disinfectant</b>	<b>% of Growers Using</b>
Formaldehyde	40
Advantage 256	40
ALAS 478	10
Cresylic Acid	10

LPH	20
DC&R	30
Glutracide	10
Gluteraldehyde	10
Pantek II	20
Dyne-o-Might	10
Biophene	10
Quaternary ammonium's, phenols, phenylphenols	20
Blue Rose	10
Iodine	10
Environ 1 Stroke	30

\*Source – Hickle, 1998

The products listed above comprise a broad range of disinfectants, cleaners and sanitizes, ranging from soaps to iodine's. Disinfectants are used between flocks to reduce pathogens. These disinfectants are applied to the inside structure and equipment in the poultry house prior to the placement of the new flock.

The diseases of primary concern to the broiler industry are Mark's Disease, infectious bronchitis, Newcastle Disease and coccidiosis. Vaccinations are provided to the chicks between one and three days of age for all except coccidiosis. Coccidiosis is controlled through a combination of cleaning and disinfection and by including a coccidiostat in the feed.

### **Biosecurity:**

Widespread endemic and epidemic diseases cost the poultry industry millions of dollars each year. One of the reasons that diseases can spread from farm to farm is because of poor farm security. Personnel and equipment can carry disease agents onto a farm. Most farms employ a strict biosecurity program to reduce traffic onto the farm. Usually, only authorized traffic is allowed. Many farms have vehicle disinfection stations at the security gate where visitors are required to spray the tires of their vehicles with a disinfectant before entering. Most farms require that visitors who go onto the production site wear sanitized coveralls, hats and footwear. Footpaths that contain disinfectants are commonly placed at the entry of each poultry house.

## **Weeds**

Weeds must be controlled on broiler farms or they can interfere with house ventilation, become fire hazards and encourage

rodents, flies and mosquitoes to breed. Weeds are generally eliminated by mechanical means such as mowing, tilling and disking. The use of herbicides is also used to help eliminate weed problems on farms (see Table 10).

**Table 10. Weed Control Herbicides**

<b>Herbicide</b>	<b>% Growers Using</b>
Round-up	76
Goal	20
Simazine	12
Krovar	4
Oust	4
Karmex	4

\*Source – Hickle, 1998

## Vertebrate Pests

California ground squirrels (*Spermophilus beechey*), wild birds, house mice (*Mus musculus*), Norway rat (*Rattus norvegicus*), roof rat (*Rattus rattus*), and other vertebrate pests such as skunks and weasels plague poultry farms but to a lesser degree than invertebrate pests. Rodents can damage buildings, kill baby chicks, eat feed and carry disease and parasites that affect the flock. They are generally more of a problem on farms with poor vegetation (weeds) management.

### Control Measures for Vertebrate Pests:

Control of vertebrate pests is achieved by using a combination of exclusion techniques, glue boards, traps and bait. Chemicals such as Bromadiolone, Diphacinone, Brodifacoum, Chlorophacinone, and Cholecalciferol are the most commonly used rodenticides (as shown in Table 9).

**Table 9. Rodent Management Program**

<b>Program</b>	<b>% of respondents listing product/method</b>	<b>Technique/Product</b>
<b>Rodent Baits</b>	20	Eraze (zinc phosphate)
	20	Clout (bromethalin)
	50	Ropax, Talon, Havoc, Jaguar (broadiacoum)
	20	tomcat (diphacinone)
	60	Maki, Hawk, Terminator (bromadiolone)
	30	County, Bar, and package bait
<b>Other Methods</b>	90	Live traps
	10	Shotgun and Pellet guns
	10	Cats
	30	Weed Control

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