

Sustainable Agriculture Research and Education (SARE) *Producer Grant Report*

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RD 309-049/6580897)



Using Nigerian Dwarf Goats for Value-added Dairy Products to Provide Off-season Sustainable Farm Income

By
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Nigerian Dwarf Goats: Great Pets, Butterfat Powerhouses

- *Full grown Does:* 17" to 21" weight 50-75 pounds
- *Full grown Bucks:* 21" to 23" weight about 75 pounds
- *Newborn kids:* 1.5 to 3 lbs. (average 2-3 kids per litter)
- *Polyestrus:* can be bred year round
- *Milk:* high butterfat and protein

Descendents of the West African Dwarf, these colorful miniature dairy goats are continually rising in popularity as pets and dairy.

Their conformation is similar to that of the larger dairy goat breeds (Saanen, LaMancha, Nubian, etc.); their body is in a balanced proportion to their small size. Their nose is straight, ears are upright and forward, and they have short to medium length hair with a soft undercoat.

Their gentle, lovable personalities, and small size make them popular with children, the elderly and people whose disabilities might not allow larger dairy animals. Of course, their small size and charming personalities also make them wonderful pets, as well as show and 4-H animals. Even breeding bucks can be handled with ease, especially if they were bottle babies!

We think their potential for farmstead cheese, yogurt and milk is largely untapped. Why? Because people generally think that the Nigerian's small size and the amount of milk they produce isn't worth the effort. But, let's take a look at it:

The butterfat in Nigerian Dwarf milk is extremely high—from 6 %-11%! If you take one gallon of Saanen goat milk (about 3.4% butterfat) you can make three 8 oz. containers of fromage cheese (a soft cream cheese). If you use one gallon of Nigerian Dwarf milk, you will get seven 8 oz. containers of fromage. That's what butterfat is all about!

A Nigerian Dwarf doe typically produces between 2 and 4 pounds of milk ("a pint's a pound the world around") per day over a normal 305-day lactation. This means that you'll get about 900 lbs or 112 gallons of wonderful, rich milk per doe!

The following report represents data we collected between October 2003 and September 2004 about milking Nigerian Dwarf Goats, making and selling value-added dairy products, and other ways of increasing farm income through using these small goats as dairy animals.

If you find you're interested in learning more about Nigerian Dwarfs as pets, home dairy or commercial dairy, check out our web site: www.kushhara.com where you'll find lots of useful information and links to other helpful sites.

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ABSTRACT

A sustainable farm's income is typically derived from produce planted in the spring and harvested and sold during the summer and early fall. This project looked at the feasibility of milking Nigerian Dwarf Goats to produce value-added dairy products for income during the farm's off-season months--late fall and winter.

INTRODUCTION

Nigerian Dwarf Goats are unique among dairy goats in that they are polyestrous, or can be bred year round. This physical attribute offers a seasonal produce farmer the opportunity to breed goats in the spring for kidding and milking in the fall and winter. This alternative dairy program could provide an income through value-added dairy products made during the farm's off-season.

SARE GRANT

In April 2003, we received funding for a Sustainable Agriculture Research and Education (SARE) grant proposal that posed the following problem:

Sustainable agriculture farmers typically do not have the benefit of income during the winter months when they are not selling produce and/or flowers. Those who would like to add the economical benefit of dairy to their operation are often discouraged because normal dairy milking cycle runs concurrent to the busy summer months when crops are the first priority.

Secondarily, because of the large size of traditional dairy animals, farmers who would have trouble managing large animals do not consider dairy as an option for them.

There is also a great deal of risk involved in the beginning development of a winter-season milk goat dairy operation. Very little information is currently available concerning the yield of milk a manager might expect from goats during the winter months. There is also little information currently available about the costs and economic returns a producer might expect from value-added processing of goats milk into cheese and butter. The marketability of these value-added products and of culled

kids that will result from a winter dairy goat operation in Virginia is uncertain.

THE DATA COLLECTED

We collected data from two groups of nine does known as Phase 1 (October 2003-March 2004) and Phase 2 (April 2004 -September 2004).

(Note: The original SARE proposal said data would be obtained from a group of ten goats in both phases of the project. Only nine goats freshened—gave birth and were able to be milked--for Phase 1; hence only nine goats were included in each group of both phases.)

Phase 1 milking does (winter: off-season) were compared to Phase 2 milking does (summer) to:

- Determine if there were seasonal influences on milking, including: yield (pounds of milk per goat) during a six-month period; percentage of butterfat; or percentage of protein.
- Determine if there was a temperature and weather influence on the amount of milk produced by Phase 1 does versus Phase 2 does.
- Compare cost of maintaining a doe for 6-month milking cycle: feed, housing, health, supplies, and milk testing etc.
- Determine marketability of Phase 1, off-season kids, versus Phase 2.
- Compare the health of Phase 1 and Phase 2 milking does.
- Compare value-added dairy products for Phase 1 and Phase 2.

Data Collection Methods and Project Overview

MILK AND MILK PRODUCTION

The following information was recorded twice daily for six months beginning on October 1, 2003 for Phase 1 and on April 1, 2004 for Phase 2. (Milking was done at 6:30 am and 6:30 p.m.)

- Date
- Pounds of milk
- Temperature
- Wind
- Weather Observed
- Humidity
- Barometer

The complete daily records collected for the duration of the project can be found on Tables 1-12 and on the website we set up at: www.kushhara.com

MONTHLY MILK TEST RESULTS

In addition to daily milk and weather data, on one day every month, milk samples were taken, individually, from two consecutive milking as part of the Dairy Herd Improvement (DHI) program. The morning and evening milkings were weighed and sampled by an independent supervisor and sent to Langston University in Oklahoma for analysis. A copy of the test results were sent to us, two to three weeks after the test, and provided the following information on each doe:

- Pounds of milk (milked on test day)
- Butterfat percentage and amount
- Protein percentage and amount
- Somatic Cell Count
- Accumulative milk data totals for each doe

A sample DHI page is included with the paper copy of this report.

COSTS ASSOCIATED WITH DAIRY DOES

Costs for grain, hay, minerals and veterinary visits were kept for the does in both phases. Because the costs associated with maintaining a goat are borne year-round, not seasonally, we didn't find a difference in the general costs for either Phase 1 or 2.

BIRTHS AND SALES

Records were kept on the kids born during each phase (total number and sex of kids). Information was also kept on their sale.

Twenty kids were born to both Phase 1 does and Phase 2 does, indicating there wasn't a seasonal effect on birth rates. Typically, it's harder to market bucks and wethers. Except for 4 does and 1 buck that we chose to keep, all other does, bucks and wethers were sold as pets, 4-H projects, or future dairy animals. Word-of-mouth and our local 4-H coordinators accounted for most sales. Flyers posted at our local general stores and farm co-ops also provided sales opportunities.

HEALTH

All does had routine fecal sample analysis; no parasitic problems were observed in either phase. Additionally all does participated in a monthly DHI test that provided individual somatic cell count information. No high or unacceptable somatic cell counts were encounter in either phase.

POTENTIAL INCOME: DAIRY & NON-DAIRY

Records were kept for income from kid sales, as well as dairy and non-dairy value-added products.

A seasonal effect of goat sales was not noted during the project. All kids offered for sale were sold without a problem. The marketing strategy with slightly different; for example, 4-H goat coordinators called us to see if we had goats in the spring, and we contacted them in the fall to let them know we had kids.

High butterfat ensured quality cheeses could be made during both phases. Depending on local and state dairy laws, year-round opportunities (wholesale and retail) exist to sell goat's milk products: hard and soft cheeses, yogurt, and milk (for human or pet use). Farmer's markets offer an opportunity to sell spring and summer dairy products, while holiday bazaars and on-farm open houses offer a better fall and winter market.

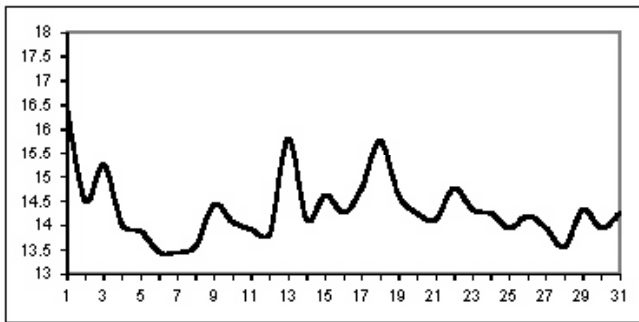
Goat's milk soap was made and sold at farmer's markets and holiday bazaars during the project. (Lotions and other beauty products made from goat's milk could also be considered for non-dairy value-added product income.)

Project Findings and Impacts

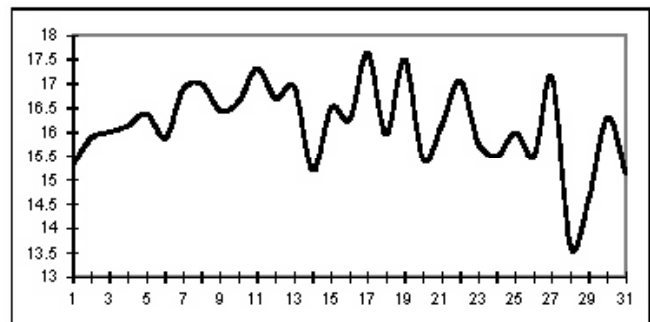
SEASONAL EFFECT ON MILK

Temperature, barometric press and milk pounds were recorded daily (Tables 1-12) and compared by month for both phases.

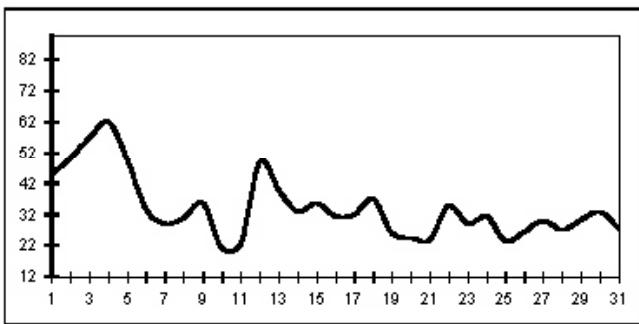
For example, January 2004, the fourth month of Phase 1, had temperatures that ranged from 15 degrees to 67 degrees and barometric pressures that ranged from 29.30 to 30.06. The daily pounds of milk ranged from 13.4 to 16.4, but the fluctuations did not appear to correlate to the corresponding daily temperature and barometric pressure. This data was compared to July 2004, the fourth month of Phase 2. July had temperatures that ranged from 67 degrees to 85 degrees and barometric pressures that ranged from 29.30 to 29.85. The daily pounds of milk ranged from 15.1 to 17.6; but again, the fluctuations did not appear to correlate to the corresponding daily temperature and barometric pressure.



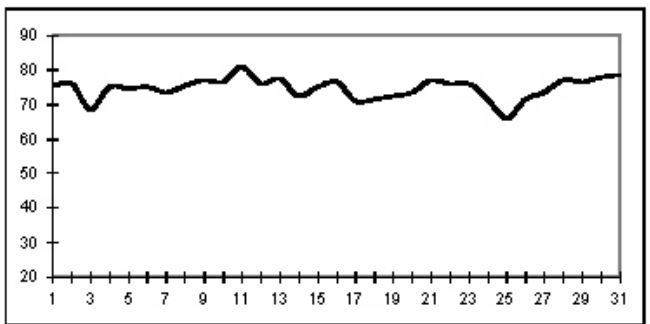
PHASE 1: DAILY MILK (JANUARY 2004)



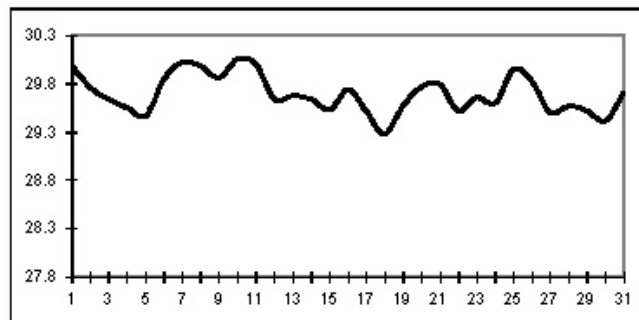
PHASE 2: DAILY MILK (JULY 2004)



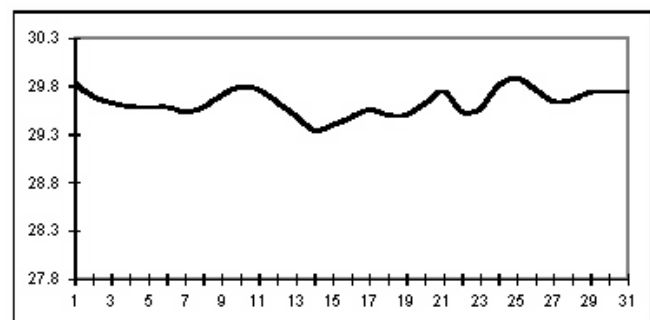
PHASE 1: DAILY TEMPERATURE (JANUARY 2004)



PHASE 2: DAILY TEMPERATURE (JULY 2004)



PHASE 1: DAILY BAROMETER (JANUARY 2004)



PHASE 2: DAILY BAROMETER (JULY 2004)

MILK PRODUCTION

A “normal” lactation is considered to be 305 days, but it is reasonable for a dairy farmer to milk for less than 10 months. The ability to breed Nigerian Dwarf goats year-round offers produce farmers to dairy farm during any or all of the non-produce growing months.

The does in Phase 1 (winter) produced 2,921 pounds of milk, or about 365 gallons of milk during the six-month period (October 1, 2003-March 31, 2004) that records were kept. The does in Phase 2 (summer) produced 3,168 pounds of milk, or about 396 gallons of milk during the six-month period (April 1, 2004-September 30, 2004) that records were kept for them. The difference of 247 pounds or 31 gallons of milk over a six-month period may reflect the capacity (and capabilities) of individual does rather than a seasonal effect.

Phase 1 Month	Pounds of Milk
October	531
November	539
December	473
January	445
February	443
March	491
Total	2,921

Phase 2 Month	Pounds of Milk
April	655
May	619
June	511
July	501
August	460
September	422
Total	3,168

MONTHLY DHI TESTING

One day, each month a DHI milk test supervisor came to the farm to weigh each goat’s milk output for two consecutive milkings. After recording the weight of each individual milking, the supervisor took a sample of the milk and put it in a test vial. The a.m. and p.m. sample vials for each doe was sent to Langston University in Oklahoma for butterfat, protein, and somatic cell count analysis.

DHI BUTTERFAT

Butterfat is measured as a percentage of the total fat or cream in the milk. The DHI results also tracked the pounds of butterfat produced by each doe during the lactation. (Note: During the project, we used one gallon of Saanen--traditional large dairy goat-- milk to make fromage blanc cheese; we got three 8 oz. containers. The same day, using the same culture, we used one gallon of Nigerian Dwarf goat milk to make fromage, and we got seven 8 oz. containers! That’s the butterfat difference. Saanen goats, considered to be one of the best dairy goats, average around 3.4 % butterfat.)

AVERAGE BUTTERFAT % (DHI TEST)

Phase 1: Winter	Butterfat %
October	7.3
November	7.3
December	7.8
January	7.5
February	7.0
March	7.2

Phase 2: Summer	Butterfat %
April	7.1
May	7.4
June	6.4
July	5.6
August	6.9
September	7.8

DHI PROTEIN

Protein is measured as a percentage of the total protein contained in the milk. DHI tests also track the pounds of protein produced by each doe during the lactation.

AVERAGE PROTEIN % (DHI TEST)

Phase 1: Winter	Protein %
October	4.6
November	4.4
December	4.8
January	4.6
February	4.7
March	4.6

Phase 2: Summer	Protein %
April	4.0
May	3.9
June	4.2
July	4.3
August	4.4
September	4.6

While we didn't see a seasonal effect of milk production, the percentage of butterfat and protein in the Nigerian's milk appears to be higher for Phase 1 (winter) milkers. The higher butterfat and protein mean that more value-added dairy products would be made from less milk--possibly making up for the lower winter milk poundage in Phase 1.

Individual doe milk records (pounds, butterfat and protein) were compared to other Nigerian Dwarf milk records kept by the American Goat Society DHI coordinator. The records kept for our project herd were typical of records kept for other herds.

SEASONAL EFFECT ON MAINTAINING A DOE

The goats had to be fed and cared for year round, regardless of when they were being milked; thus, the costs for caring and feeding the does in Phase 1 and Phase 2 were the same.

The following table breaks down the cost per year per doe, based on a herd of 18 does (total does in this SARE project). Additionally, \$35 was added to the cost chart for buying cultures to make cheese (hard, soft and yogurt). The cost of the cultures is based on milking the doe for six months, and using all of her milk (averaged 42 lbs.) to make value-added products.

COST PER DOE PER FULL YEAR

16% grain	\$76
Hay	\$55
Straw	\$10
Salt/Minerals	\$3
Vet Fees	\$12
DHI Fees	\$20
Cultures for Value-added Products (6 mos.)	\$35
Total Costs/Yr	\$211

When the \$211 cost is divided by the average of 42 gallons of milk given per doe during each six month lactation—41 gallons were given per doe in Phase 1 and 44 gallons were given per doe in Phase 2-- the milk costs approximately \$5 per gallon.

It should be noted that 10 months or 305 days is a normal lactation. A milking period longer than six months would decrease the cost per gallon and increase the potential income per doe charted on page 10.

SEASONAL EFFECT ON BIRTHS AND KID SALES

PHASE I DOES & KIDS

Doe	Freshen Date	Kids
Polka Dottie	8/19/03	2 Does
Penny	9/8/03	2 Bucks
Zoey	9/12/03	2 Does
Warpaint	9/13/03	1 Doe 2 Bucks
Maggie	9/17/03	1 Doe 1 Buck
Noelle	9/20/03	1 Doe 2 Bucks
Shelly	9/22/03	1 Doe 1 Buck
Elena	9/25/03	3 Does
Zorra	9/27/03	1 Doe

Nine Nigerian Dwarf Goats kidded between August 19, 2003 and September 27, 2003. The kids were removed at birth and bottle-fed. The mothers were milked twice a day; data was recorded from October 1, 2003 when Phase 1 officially began through March 31, 2004 when Phase 1 ended.

Twenty kids (12 does and 8 bucks) were born to the does participating in Phase 1. Two does were kept; the remaining does went to previous owners. The eight bucks were castrated (wethered) and dehorned; they were sold as 4-H projects or pets. No problems were encountered selling wethers during the fall, and we had many requests for and offers to buy does.

Marketing for Phase 1 wethers included posting "For Sale" notices at local general stores and farm co-ops, notifying the county 4-H leaders in our area, and word-of-mouth.

PHASE 2 DOES & KIDS

Doe	Freshen Date	Kids
Minnie	3/1/04	2 Does 2 Bucks
Honey	3/1/04	2 Does 1 Buck
Jill	3/2/04	1 Buck
Licorice	3/7/04	2 Bucks
Marilyn	3/15/04	1 Buck
Helga	3/18/04	1 Doe
Thumbelina	3/18/04	3 Bucks
Belle	3/21/04	2 Bucks
Cinnamon Bun	3/22/04	2 Does 1 Buck

Nine Nigerian Dwarf Goats kidded between March 1 and March 22, 2004. The kids were removed at birth and bottle-fed. The mothers were milked twice a day; data was recorded from April 1, 2004 when Phase 2 officially began through September 30, 2004 when Phase 2 ended.

Twenty kids (7 does and 13 bucks) were born to the does participating in Phase 2. Three does were kept; two does went to a previous owner, and two does were sold. Twelve bucks were castrated (wethered) and dehorned; they were sold as 4-H projects or pets; one buck was kept as a future herd sire. No problems were encountered selling wethers during the spring and, again, we had many requests to buy more does.

Marketing for Phase 2 does and wethers was the same as for Phase 1: posting "For Sale" notices at local general stores and farm co-ops, notifying the county 4-H leaders in our area, and word-of-mouth.

SEASONAL EFFECTS ON HEALTH

Periodic fecal tests indicated no parasitic problems with the does in either phase.

The monthly DHI tests also provided an indication of health through a somatic cell count, or SCC.

The SCC measured the number of white blood cells in each does milk. High numbers (usually over 500,000) indicate a problem with the doe. Mastitis is often the cause of high a SCC.

Each SCC number represents a range of white blood cells in 1000th. The milk from a doe with a SCC number of 6 or more is unacceptable dairy milk. The milk would be discarded until the associated medical problem is corrected and the SCC returns to an acceptable number.

SOMATIC CELL COUNT (DHI HERD AVERAGE)

Phase 1: Winter	Somatic Cell Count
October	0.1
November	1.7
December	0.9
January	1.5
February	1.0
March	1.3

Phase 2: Summer	Somatic Cell Count
April	1.3
May	2.1
June	1.4
July	0.9
August	1.7
September	1.5

CONVERSION FOR SCC NUMBERS ABOVE

SCC	(1000)	SCC	(1000)
0	0-18	5	284-565
1	19-35	6	566-1130
2	36-71	7	1131-2262
3	72-141	8	2263-4523
4	142-283	9	4524-9999

SEASONAL EFFECT ON VALUE-ADDED PRODUCT SALES

The following table describes the potential income for value-added products. Again, since there was only a three-gallon of milk difference per doe between Phase 1 does and Phase 2 does, the dollar amounts below are based on the average, or 42 gallons of milk per doe.

The selling price of the value-added dairy items is based on retail store prices and advertised local product sales prices.

VALUE-ADDED DAIRY INCOME/PER DOE

Value-Added Product	Price	Potential Gross Income (based on 42 gal/per goat/6 months)
Pet-Use Milk	\$12/Gal	\$504
Grade A Milk	\$4/Qt	\$672
Yogurt	\$4/Qt	\$672
Hard Cheese	\$16/Lb	\$1008
Soft Cheese	\$4/8-oz.	\$1176

Again, it should be noted that 10 months or 305 days is a normal lactation. A milking period longer than six months would increase the gallons per goat and, thus, the potential income per doe.

NON-DAIRY INCOME POTENTIAL: SOAP

An assortment of oils and about 32-ounces of goat’s milk were used to make 32 4-ounce bars of Goat’s Milk Soap. The cost of making the soap was approximately \$20. The gross income potential (at \$4/bar) was approximately \$128.

The bars of soap made during Phase 1 (winter) were sold at a Christmas Bazaar and other holiday events. The bars of soap made during Phase 2 (summer) were sold at a Farmer’s market. All soaps, regardless of season, were easily sold.

NON-DAIRY INCOME POTENTIAL: GOAT SALES

Although no milking does were sold during the SARE project, they typically can be sold for \$350 and up. We sold wether kids (castrated males) during Phase 1 and Phase 2 as pets (\$75) and for 4-H (\$50). Additionally there is the potential for selling market goats (\$50); we didn’t sell any goats for meat.

Doe kids usually sell for \$300, and exceptional buck kids (intact) can be sold as future herd sires for \$150.

SARE Project Conclusions

The milk production, weather, birthing, costs and income records that were kept for each phase of the SARE project, demonstrate that Nigerian Dwarf Goats can be profitable dairy animals, regardless of the time of year they are milked. Because they can be bred year-round, they have the added potential of providing off-season income to produce farmers.

Large dairy goats give an average of 4-8 pounds of milk a day. Nigerian Dwarf Goats are not typically thought of as viable dairy animals because they average between 2-4 pounds of milk a day. However, because their milk has almost twice the butterfat (Saanen’s average: 3.4% verses Nigerian’s average: 7.1%) and more protein (Saanen’s average: 3.1% verses Nigerian’s average: 4.4%), a lot more hard and soft cheeses can be made from a smaller amount of milk.

By introducing Nigerian Dwarf Goats to traditional produce farmers and providing substantiated data about their potential as dairy animals, we believe we have demonstrated that Nigerian Dwarf Goats can provide a viable off-season dairy income.

Through an ongoing outreach effort, we hope to continue introducing a diverse audience of farmers and non-farmers to Nigerian Dwarf Goats, and their potential as dairy animals.

Table 1

Oct-03		Milk (pounds &10th)	Total Milk Per Day	Temp	Wind	Weather	Humidity	Barometer
Phase 1								
1	AM	8.56		55	0	Sunny	59%	29.81
	PM	7.13	15.69	60	0	Sunny	60%	29.78
2	AM	8.06		45	0	Sunny	64%	29.73
	PM	8.13	16.19	52	0	Sunny	60%	29.82
3	AM	8.06		39	0	Sunny	62%	29.89
	PM	7.00	15.06	55	0	Sunny	65%	29.68
4	AM	8.63		47	7SW	Sunny	69%	29.52
	PM	7.81	16.44	63	0	Sunny	65%	29.51
5	AM	8.19		48	2SW	Sunny	63%	29.64
	PM	8.58	16.77	59	0	Sunny	61%	29.66
6	AM	7.69		52	0	Sunny	65%	29.83
	PM	8.06	15.75	62	0	Sunny	66%	29.73
7	AM	8.06		51	0	Sunny	64%	29.84
	PM	7.31	15.37	70	0	Sunny	70%	29.79
8	AM	9.00		53	0	P. Cloudy	70%	29.88
	PM	8.38	17.38	69	0	P. Cloudy	72%	29.85
9	AM	8.69		59	0	Sunny	61%	29.86
	PM	8.25	16.94	70	0	Sunny	61%	29.82
10	AM	8.88		56	1N	Sunny	61%	29.78
	PM	8.50	17.38	77	0	Sunny	64%	29.75
11	AM	9.00		60	0	Sunny	64%	29.79
	PM	8.65	17.65	65	0	Sunny	65%	29.76
12	AM	7.63		57	0	Cloudy	82%	29.61
	PM	8.25	15.88	72	0	Cloudy	82%	29.54
13	AM	8.63		58	1NW	P. Cloudy	84%	29.68
	PM	8.13	16.76	74	0	P. Cloudy	82%	29.62
14	AM	10.44		58	0	Cloudy	91%	29.53
	PM	7.63	18.07	63	8SW	Raining	95%	29.72
15	AM	9.38		56	6NW	Sunny	60%	29.25
	PM	8.38	17.76	60	2N	Sunny	60%	29.53
16	AM	9.56		47	4SW	Sunny	66%	29.77
	PM	8.00	17.56	64	4SW	Sunny	66%	29.70
17	AM	9.63		49	1N	Sunny	72%	29.79
	PM	8.00	17.63	58	0	Raining	74%	29.75
18	AM	9.38		47	0	Sunny	78%	29.78
	PM	9.00	18.38	57	0	Clear	50%	29.68
19	AM	9.13		44	0	Cloudy	77%	29.64
	PM	8.00	17.13	65	0	Clear	48%	29.71
20	AM	9.31		44	0	Sunny	78%	29.87
	PM	7.94	17.25	65	2s	Clear	51%	29.72
21	AM	9.50		58	12SW	Cloudy	74%	29.37
	PM	8.31	17.81	66	0	Clear	63%	29.26
22	AM	9.38		52	0	P. Cloudy	71%	29.29
	PM	8.13	17.51	52	1NW	P. Cloudy	70%	29.32
23	AM	9.88		44	1N	P. Cloudy	60%	29.42
	PM	8.13	18.01	50	2 NW	Clear	39%	29.49
24	AM	9.44		35	0	Clear	71%	29.79
	PM	8.13	17.57	56	0	Clear	40%	29.92
25	AM	9.69		39	0	Clear	73%	30.05
	PM	7.63	17.32	61	3SW	Cloudy	59%	29.99
26	AM	9.56		56	4SW	Cloudy	89%	29.88
	PM	8.38	17.94	63	1S	Rain	90%	29.71
27	AM	9.25		62	4SW	Rain	91%	29.46
	PM	7.81	17.06	57	1NE	Rain	83%	29.42
28	AM	8.94		44	0	Cloudy	81%	29.60
	PM	8.50	17.44	49	2NW	Rain	81%	29.52
29	AM	9.63		48	0	Rain	86%	29.33
	PM	7.88	17.51	54	0	Clear	60%	29.57
30	AM	9.13		41	0	Clear	78%	29.82
	PM	8.69	17.82	65	0	Clear	42%	29.91
31	AM	9.13		49	2S	Clear	72%	29.92
	PM	8.39	17.52	63	0	Clear	60%	29.89

530.55

TABLE 2

November-03		Milk (pounds &10th)	Total Milk Per Day	Temp	Wind	Weather	Humidity	Barometer
Phase 1								
1	AM	10.00		51	0	Clear	79%	29.90
	PM	8.00	18	73	0	Clear	45%	29.87
2	AM	11.44		60	0	Clear	77%	29.91
	PM	8.75	20	72	2S	Clear	58%	29.84
3	AM	12.38		59	1SW	Clear	74%	29.82
	PM	10.25	22.63	73	1S	Clear	50%	29.76
4	AM	12.60		60	1S	Clear	76%	29.77
	PM	11.30	23.9	73	2SW	Clear	62%	29.74
5	AM	11.75		68	6SW	P.Cloudy	88%	29.70
	PM	10.44	22.19	72	0	Rain	86%	29.73
6	AM	10.60		68	0	Rain	90%	29.74
	PM	10.00	20.6	66	0	Rain	89%	29.71
7	AM	10.88		60	0	P. Cloudy	87%	29.75
	PM	9.69	20.57	58	0	P. Cloudy	60%	29.86
8	AM	9.13		45	3N	Clear	45%	30.03
	PM	9.44	18.57	50	1B	Clear	36%	30.13
9	AM	11.19		36	1N	P.Cloudy	53%	30.03
	PM	9.31	20.5	46	0	Clear	35%	30.25
10	AM	10.00		29	0	Clear	67%	30.17
	PM	9.19	19.19	51	0	Clear	39%	30.04
11	AM	10.31		41	7SW	Clear	82%	29.89
	PM	9.38	19.69	58	4SW	Clear	57%	29.31
12	AM	10.69		59	0	Cloudy	63%	29.58
	PM	9.19	19.88	59	8SW	Rain	88%	29.46
13	AM	10.50		56	9NW	P. Cloudy	34%	29.32
	PM	8.94	19.44	41	6NW	P. Cloudy	28%	29.63
14	AM	9.94		33	0	Clear	53%	29.72
	PM	7.19	17.13	36	0	Clear	48%	29.86
15	AM	9.44		41	0	Clear	44%	29.82
	PM	7.19	16.63	48	2SW	Clear	55%	29.84
16	AM	9.25		48	0	Cloudy	76%	29.84
	PM	7.19	16.44	50	3W	Rain	89%	29.45
17	AM	8.88		49	0	Cloudy	84%	29.82
	PM	8.25	17.13	61	0	Clear	60%	29.90
18	AM	8.88		47	0	Cloudy	80%	29.94
	PM	7.38	16.26	52	3NE	Cloudy	85%	29.78
19	AM	8.31		62	6SE	Cloudy	89%	29.47
	PM	8.88	17.19	60	5SE	Rain	89%	29.48
20	AM	9.56		48	6N	Clear	59%	29.47
	PM	7.44	17	58	0	Clear	34%	29.63
21	AM	9.38		45	1S	Clear	65%	29.69
	PM	7.69	17.07	63	0	Clear	48%	29.67
22	AM	8.75		45	0	Clear	74%	29.75
	PM	7.69	16.44	68	1SE	Clear	44%	29.73
23	AM	8.19		46	0	Clear	83%	29.82
	PM	7.00	15.19	62	0	Clear	60%	29.75
24	AM	8.38		47	2SE	Clear	86%	29.61
	PM	7.56	15.94	66	11S	Rain	63%	29.34
25	AM	8.56		34	0	Clear	73%	29.82
	PM	6.69	15.25	48	0	Clear	43%	29.82
26	AM	9.13		36	7SW	Clear	62%	29.81
	PM	6.63	15.76	44	0	Clear	66%	29.84
27	AM	8.19		43	0	P. Cloudy	73%	29.85
	PM	7.69	15.88	54	1SW	Rain	66%	29.75
28	AM	8.44		57	5S	Rain	91%	29.44
	PM	6.56	15	54	5W	Rain	81%	29.16
29	AM	8.56		34	6W	Clear	49%	29.42
	PM	6.31	14.87	41	4W	Clear	40%	29.70
30	AM	8.00		33	7W	P. Cloudy	59%	29.68
	PM	6.38	14.38	52	7SW	Clear	36%	29.60

538.91

TABLE 3

December-03		Milk (pounds &10th)	Total Milk Per Day	Temp	Wind	Weather	Humidity	Barometer
Phase 1								
1	AM	8.06		50	3W	P. Cloudy	39%	29.55
	PM	7.06	15.12	55	6N	Clear	24%	29.74
2	AM	8.25		35	1NW	Clear	36%	29.95
	PM	7.31	15.56	47	0	Clear	27%	30.02
3	AM	8.63		33	0	Clear	46%	30.21
	PM	7.38	16.01	40	0	P.Cloudy	35%	30.17
4	AM	9.19		30	5SW	Cloudy	63%	30.12
	PM	6.63	15.82	37	0	Snow	68%	29.98
5	AM	9.00		35	0	Sleet	80%	29.67
	PM	7.50	16.50	36	0	Snow	82%	29.58
6	AM	8.56		33	0	Cloudy	72%	29.60
	PM	6.56	15.12	40	2N	Clear	72%	29.62
7	AM	9.00		29	2E	Clear	67%	29.69
	PM	6.56	15.56	38	0	Clear	53%	29.73
8	AM	8.56		26	0	Clear	67%	29.80
	PM	7.00	15.56	44	0	Clear	44%	29.82
9	AM	8.19		34	0	P.Cloudy	66%	29.85
	PM	6.75	14.94	43	0	P.Cloudy	53%	29.84
10	AM	8.31		34	0	Cloudy	72%	29.72
	PM	7.13	15.44	40	1NE	Rain	82%	29.33
11	AM	7.81		49	2N	Cloudy	78%	29.03
	PM	7.56	15.37	42	2SW	Clear	49%	29.48
12	AM	7.44		33	0	Clear	68%	29.68
	PM	7.81	15.25	44	0	Clear	48%	29.86
13	AM	8.00		35	0	Cloudy	38%	29.92
	PM	6.19	14.19	38	1NE	Cloudy	40%	30.07
14	AM	7.75		33	5N	Snow	77%	29.76
	PM	7.25	15	36	0	Cloudy	76%	29.38
15	AM	7.75		34	0	Clear	75%	29.52
	PM	6.68	14.43	41	0	Clear	64%	29.77
16	AM	7.63		31	1S	Clear	76%	29.83
	PM	7.56	15.19	37	0	Clear	82%	29.94
17	AM	7.31		47	2NW	Cloudy	85%	29.37
	PM	7.39	14.7	49	1NW	Clear	64%	29.41
18	AM	7.75		31	0	Cloudy	59%	29.43
	PM	7.00	14.75	37	4sw	Cloudy	59%	29.42
19	AM	7.94		36	2N	Cloudy	49%	29.48
	PM	7.00	14.94	25	1SW	Clear	59%	29.50
20	AM	7.94		32	3NW	Clear	42%	29.69
	PM	7.63	15.57	31	2W	Clear	47%	29.93
21	AM	7.00		34	3W	Clear	29%	29.94
	PM	7.25	14.25	32	7SW	Clear	27%	29.87
22	AM	8.19		34	8W	Clear	46%	29.82
	PM	6.75	14.94	54	8SW	Cloudy	34%	29.78
23	AM	8.31		44	7SW	Clear	45%	29.72
	PM	7.25	15.56	54	9SW	Cloudy	54%	29.49
24	AM	8.31		57	6S	Rain	88%	29.37
	PM	7.13	15.44	45	1N	Clear	59%	29.55
25	AM	8.25		31	1N	Clear	60%	29.67
	PM	7.25	15.50	38	0	Clear	59%	29.76
26	AM	7.75		29	2SW	P. Cloudy	60%	29.88
	PM	7.06	14.81	41	0	Clear	46%	29.85
27	AM	8.44		37	2N	Clear	36%	29.93
	PM	7.81	16.25	46	0	Clear	39%	29.95
28	AM	7.38		31	0	Clear	30%	30.03
	PM	7.44	14.82	48	2SW	Clear	41%	29.96
29	AM	8.25		37	4SW	Clear	60%	29.83
	PM	7.00	15.25	52	10SW	Clear	39%	29.68
30	AM	8.75		53	3W	P.Cloudy	56%	29.55
	PM	6.75	15.50	59	1W	Clear	56%	29.67
31	AM	8.13		30	0	Clear	61%	29.99
	PM	7.06	15.19	48	7SW	Clear	30%	29.86

472.53

TABLE 4

Jan-04		Milk (pounds &10th)	Total Milk Per Day	Temp	Wind	Weather	Humidity	Barometer
Phase 1								
1	AM	8.81		37	0	P.Cloudy	47%	30.03
	PM	7.63	16.44	53	0	P.Cloudy	41%	29.92
2	AM	7.69		44	10SW	Rain	75%	29.75
	PM	6.81	14.50	57	2SW	P.Cloudy	70%	29.76
3	AM	7.94		49	3SW	P.Cloudy	75%	29.66
	PM	7.31	15.25	65	10SW	Clear	59%	29.61
4	AM	7.81		61	8SW	Cloudy	75%	29.56
	PM	6.19	14.00	63	2N	P.Cloudy	65%	29.53
5	AM	7.88		49	4N	Rain	76%	29.44
	PM	6.00	13.88	50	1NE	Cloudy	83%	29.49
6	AM	7.06		34	2SW	P.Cloudy	69%	29.79
	PM	6.38	13.44	33	3N	Clear	28%	29.91
7	AM	7.13		23	0	Clear	38%	30.04
	PM	6.31	13.44	35	0	Clear	27%	30.00
8	AM	7.44		28	1NW	Clear	35%	30.04
	PM	6.13	13.57	34	6SW	Cloudy	27%	29.92
9	AM	7.31		36	3N	Snow	61%	29.87
	PM	7.13	14.44	35	3N	Clear	50%	29.84
10	AM	7.75		18	9NE	Clear	23%	30.03
	PM	6.31	14.06	24	0	Clear	32%	30.07
11	AM	7.56		15	2SW	Clear	39%	30.09
	PM	6.35	13.91	30	6SW	P.Cloudy	35%	29.91
12	AM	7.81		31	9SW	Clear	68%	29.64
	PM	6.00	13.81	67	2NW	Clear	24%	29.64
13	AM	8.56		38	4W	Clear	64%	29.64
	PM	7.25	15.81	42	1NW	Clear	38%	29.71
14	AM	7.31		30	2S	Clear	51%	29.83
	PM	6.81	14.12	36	6SE	Clear	46%	29.44
15	AM	8.00		35	6NE	P.Cloudy	55%	29.44
	PM	6.63	14.63	36	8N	Clear	25%	29.61
16	AM	7.38		23	0	Clear	39%	29.80
	PM	6.88	14.26	40	0	Clear	24%	29.67
17	AM	8.13		31	2W	P.Cloudy	54%	29.58
	PM	6.63	14.76	33	3W	Cloudy	58%	29.46
18	AM	8.81		38	5SW	Rain	88%	29.26
	PM	6.94	15.75	36	5N	Clear	56%	29.30
19	AM	8.06		26	3N	Clear	43%	29.49
	PM	6.56	14.62	26	6N	Clear	36%	29.65
20	AM	8.19		23	0	Clear	34%	29.75
	PM	6.06	14.25	26	6N	Clear	34%	29.78
21	AM	7.56		20	0	Clear	52%	29.87
	PM	6.56	14.12	28	0	Clear	42%	29.71
22	AM	8.13		29	5SW	Clear	55%	29.56
	PM	6.63	14.76	41	4NW	Clear	27%	29.47
23	AM	7.94		24	0	Clear	42%	29.70
	PM	6.38	14.32	34	2E	Clear	35%	29.62
24	AM	7.69		30	2N	Cloudy	39%	29.47
	PM	6.56	14.25	33	1N	Clear	43%	29.74
25	AM	7.69		24	3NE	Cloudy	32%	30.01
	PM	6.25	13.94	23	3N	Snow	72%	29.89
26	AM	7.75		27	1N	Snow	62%	29.82
	PM	6.44	14.19	26	3N	Cloudy	68%	29.82
27	AM	7.56		27	3N	Cloudy	69%	29.62
	PM	6.38	13.94	33	0	Cloudy	71%	29.38
28	AM	7.25		23	3N	Clear	60%	29.53
	PM	6.31	13.56	31	1N	Clear	49%	29.6
29	AM	8.13		25	4N	Clear	52%	29.54
	PM	6.19	14.32	36	2N	P.Cloudy	49%	29.5
30	AM	7.88		33	2NE	Cloudy	54%	29.42
	PM	6.06	13.94	33	3NW	Cloudy	30%	29.42
31	AM	7.56		20	0	Clear	35%	29.63
	PM	6.69	14.25	35	0	Clear	33%	29.78

444.53

TABLE 5

Feb-04		Milk (pounds &10th)	Total Milk Per Day	Temp	Wind	Weather	Humidity	Barometer
Phase 1								
1	AM	7.69		21	0	Clear	43%	30.00
	PM	6.69	14.38	38	1NE	Clear	33%	30.09
2	AM	7.56		28	0	Clear	46%	30.16
	PM	6.63	14.19	42	0	Clear	42%	30.04
3	AM	8.00		36	0	Rain/Ice	78%	29.69
	PM	6.19	14.19	50	2SW	Clear	60%	29.60
4	AM	7.88		33	0	Clear	72%	29.90
	PM	6.69	14.57	42	4NE	Clear	69%	30.06
5	AM	8.06		29	1NE	Clear	60%	30.20
	PM	6.69	14.75	40	0	Cloudy	41%	30.15
6	AM	8.06		37	9	Rain/Ice	74%	29.81
	PM	6.25	14.31	37	0	Rain/Ice	79%	29.84
7	AM	7.69		36	2NE	Cloudy	78%	29.22
	PM	6.88	14.57	38	5NW	Clear	39%	29.57
8	AM	8.06		31	3N	Clear	43%	30.01
	PM	7.00	15.06	40	0	clear	29%	30.16
9	AM	8.06		33	12SW	P.Cloudy	49%	30.07
	PM	6.69	14.75	46	2SW	P.Cloudy	44%	29.92
10	AM	8.06		39	3SW	Cloudy	69%	29.76
	PM	7.40	15.46	48	3SW	Clear	42%	29.63
11	AM	8.25		36	1SE	Cloudy	50%	29.76
	PM	7.13	15.38	41	0	Clear	41%	29.88
12	AM	8.94		38	0	Cloudy	54%	29.88
	PM	7.13	16.07	37	3SW	Clear	71%	29.80
13	AM	7.56		33	0	Clear	75%	29.79
	PM	7.60	15.16	50	4SW	Clear	26%	29.74
14	AM	8.13		41	4SW	Cloudy	29%	29.65
	PM	7.63	15.76	48	2SW	Cloudy	24%	29.59
15	AM	8.06		39	5NE	Clear	44%	29.74
	PM	6.56	14.62	34	6NE	Cloudy	31%	29.94
16	AM	8.00		28	6N	Clear	30%	30.18
	PM	7.13	15.13	37	0	Clear	26%	30.21
17	AM	8.19		29	0	Cloudy	46%	30.16
	PM	6.88	15.07	41	0	Cloudy	45%	30.06
18	AM	8.06		32	0	Clear	54%	29.91
	PM	7.63	15.69	41	0	Clear	45%	29.94
19	AM	8.19		40	12SW	Clear	32%	29.62
	PM	7.38	15.57	63	0	Clear	24%	29.56
20	AM	8.44		39	0	Clear	58%	29.60
	PM	7.81	16.25	61	10SW	Clear	25%	29.25
21	AM	8.81		54	9SW	Clear	36%	29.27
	PM	7.00	15.81	63	2N	Clear	24%	29.43
22	AM	9.81		38	0	Clear	53%	29.81
	PM	7.19	17.00	47	0	Clear	33%	29.86
23	AM	8.69		32	0	Clear	60%	29.94
	PM	6.88	15.57	50	2SW	P.Cloudy	33%	29.83
24	AM	8.44		41	0	Cloudy	58%	29.69
	PM	7.44	15.88	44	4SW	P. Cloudy	42%	29.56
25	AM	8.19		35	0	Clear	48%	29.82
	PM	6.44	14.63	57	8NE	Clear	19%	29.87
26	AM	9.19		36	4N	Cloudy	44%	30.01
	PM	7.44	16.63	42	3NE	Clear	38%	29.92
27	AM	7.31		38	1NW	Clear	38%	29.91
	PM	7.19	14.5	42	0	Clear	39%	29.92
28	AM	8.56		38	1N	Clear	30%	30.03
	PM	7.56	16.12	65	0	Clear	18%	30
29	AM	8.25		37	1SW	Clear	34%	29.98
	PM	7.50	15.75	66	0	Clear	30%	29.9

442.82

TABLE 6

March-04		Milk (pounds &10th)	Total Milk Per Day	Temp	Wind	Weather	Humidity	Barometer
Phase 1								
1	AM	8.69		42	0	Clear	36%	29.89
	PM	7.50	16.19	62	7SW	Clear	44%	29.79
2	AM	8.00		58	8SW	Clear	73%	29.74
	PM	7.13	15.13	55	3SW	Clear	69%	29.85
3	AM	7.56		49	0	Clear	63%	29.96
	PM	7.44	15.00	65	0	Clear	37%	29.90
4	AM	8.31		58	6SW	P. Cloudy	63%	29.74
	PM	7.88	16.19	60	0	P.Cloudy	62%	29.80
5	AM	8.00		51	3SE	Cloudy	77%	29.78
	PM	7.88	15.88	76	11SW	P.Cloudy	48%	29.51
6	AM	8.19		60	6SW	Rain	81%	29.29
	PM	7.88	16.07	55	4SW	Clear	68%	29.45
7	AM	7.88		42	0	Clear	65%	29.66
	PM	8.25	16.13	54	14NW	Rain	51%	29.42
8	AM	8.00		47	4N	P.Cloudy	36%	29.47
	PM	7.13	15.13	40	0	Clear	54%	29.68
9	AM	8.13		39	0	P.Cloudy	63%	29.70
	PM	7.31	15.44	48	0	Clear	44%	29.79
10	AM	8.88		37	1NW	Clear	60%	29.88
	PM	7.63	16.51	48	0	Cloudy	60%	29.88
11	AM	8.00		34	1N	Clear	64%	29.85
	PM	9.60	17.60	53	2SW	Clear	29%	29.56
12	AM	10.00		51	8NW	Clear	20%	29.64
	PM	8.44	18.44	54	4NW	Clear	42%	29.84
13	AM	8.38		33	0	Clear	50%	29.96
	PM	8.75	17.13	45	0	Clear	33%	30.09
14	AM	7.88		42	11SW	Cloudy	47%	30.10
	PM	8.00	15.88	58	3SW	Cloudy	28%	29.84
15	AM	8.00		49	0	P.Cloudy	60%	29.85
	PM	7.88	15.88	42	2N	Cloudy	62%	29.70
16	AM	8.80		46	1N	Rain	71%	29.61
	PM	7.56	16.36	43	1N	Rain	69%	29.50
17	AM	7.69		40	2SW	Cloudy	62%	29.60
	PM	8.19	15.88	45	2N	Cloudy	70%	29.62
18	AM	8.06		39	0	Cloudy	72%	29.75
	PM	7.75	15.81	50	0	Cloudy	65%	29.70
19	AM	7.69		42	2N	Clear	76%	29.75
	PM	7.63	15.32	54	0	Clear	41%	30.10
20	AM	8.00		35	5SW	Clear	70%	30.10
	PM	7.81	15.81	61	12SW	Clear	61%	29.51
21	AM	8.56		55	7NW	P.Cloudy	49%	29.50
	PM	7.31	15.87	46	5NW	P.Cloudy	29%	29.68
22	AM	8.50		32	2NW	P.cloudy	39%	29.82
	PM	7.00	15.50	36	2NW	P.cloudy	39%	29.90
23	AM	8.31		29	4SW	Clear	39%	30.12
	PM	8.13	16.44	46	2SW	Clear	21%	30.08
24	AM	8.63		39	3SW	Clear	35%	30.16
	PM	7.63	16.26	45	2SW	P.Cloudy	39%	30.18
25	AM	7.94		52	10NW	P.cloudy	45%	30.20
	PM	7.19	15.13	67	2E	P.cloudy	31%	30.11
26	AM	7.56		58	4SW	Clear	60%	30.11
	PM	7.31	14.87	70	5SW	P. couldy	43%	29.98
27	AM	7.69		58	0	P.cloudy	63%	29.93
	PM	7.69	15.38	58	0	P.cloudy	78%	29.86
28	AM	8.13		60	2SE	Cloudy	62%	30.01
	PM	6.10	14.23	62	4SE	Clear	60%	29.99
29	AM	8.63		41	2E	Cloudy	60%	29.98
	PM	7.69	16.32	64	7E	Clear	38%	29.93
30	AM	7.88		45	2E	Cloudy	69%	29.88
	PM	7.00	14.88	49	2E	Rain	78%	29.76
31	AM	7.69		49	2E	Rain	78%	29.58
	PM	6.94	14.63	52	0	Cloudy	75%	29.43

491.29

TABLE 7

April-04		Milk (pounds &10th)	Total Milk Per Day	Temp	Wind	Weather	Humidity	Barometer
PHASE 2								
1	AM	11.56		49	0	Rain	81%	29.20
	PM	11.75	23	47	2W	Rain	66%	29.19
2	AM	11.63		45	0	Cloudy	74%	29.25
	PM	10.94	22.57	47	3N	Rain	78%	29.40
3	AM	12.50		49	4N	Cloudy	68%	29.40
	PM	10.94	23.44	53	3SW	P.Cloudy	48%	29.30
4	AM	11.44		45	4W	P.Cloudy	40%	29.36
	PM	11.00	22.44	43	9W	Clear	33%	29.44
5	AM	11.75		38	2N	Clear	26%	29.56
	PM	11.00	22.75	45	0	Clear	34%	29.42
6	AM	11.38		40	5SW	Clear	27%	29.76
	PM	10.00	21.38	56	0	Clear	30%	29.55
7	AM	10.06		49	0	Clear	45%	29.48
	PM	11.31	21.37	64	0	Clear	33%	29.38
8	AM	11.88		49	2N	P.cloudy	48%	29.39
	PM	11.88	23.76	71	5NE	Clear	34%	29.26
9	AM	11.38		45	0	Clear	70%	29.46
	PM	10.50	21.88	45	0	Clear	65%	29.26
10	AM	12.06		50	0	Clear	49%	29.74
	PM	9.94	22	60	0	Clear	31%	29.64
11	AM	12.38		49	5NW	Rain	72%	29.69
	PM	10.00	22.38	48	3N	Rain	73%	29.75
12	AM	10.94		48	6NE	Rain	74%	29.74
	PM	10.31	21.25	49	4NE	Rain	78%	29.58
13	AM	10.63		47	4N	Rain	78%	29.50
	PM	10.38	21.01	50	2N	Rain	82%	29.24
14	AM	11.31		51	0	Rain	83%	29.33
	PM	10.31	21.62	48	2NW	Rain	62%	29.49
15	AM	12.00		46	10NW	Clear	45%	29.65
	PM	9.94	21.94	64	2N	Clear	26%	29.77
16	AM	11.38		39	0	Clear	61%	29.99
	PM	9.81	21.19	70	0	Clear	50%	29.95
17	AM	11.88		57	3SW	Clear	50%	29.91
	PM	9.31	21.19	80	5SW	Clear	25%	29.83
18	AM	12.31		62	0	Clear	38%	29.80
	PM	10.44	22.75	81	4SW	Clear	25%	29.89
19	AM	13.00		70	7SW	Clear	34%	29.81
	PM	9.56	22.56	79	7SW	Clear	33%	29.65
20	AM	12.50		66	0	Clear	51%	29.70
	PM	10.38	22.88	79	8SE	Clear	36%	29.62
21	AM	11.50		63	0	Clear	67%	29.68
	PM	10.00	21.5	78	11SW	Clear	33%	29.57
22	AM	11.31		60	2SW	Clear	31%	29.66
	PM	11.00	22.31	76	0	Clear	43%	29.69
23	AM	10.50		65	3SW	Clear	69%	29.71
	PM	10.68	21.18	69	5SW	P.Cloudy	69%	29.72
24	AM	10.00		63	3NE0	Clear	66%	29.85
	PM	10.25	20.25	73	0	Clear	42%	29.85
25	AM	10.38		60	3SE	Clear	64%	29.90
	PM	10.60	20.98	60	4SW	Cloudy	79%	29.75
26	AM	11.38		62	4SW	Cloudy	87%	29.61
	PM	10.50	21.88	60	2SW	Rain	89%	29.50
27	AM	10.88		62	0	Clear	76%	29.51
	PM	11.39	22.27	49	2N	Clear	50%	29.63
28	AM	10.44		49	2NW	Clear	44%	29.90
	PM	9.38	19.82	58	2S	Clear	37%	29.92
29	AM	10.13		52	5SW	Clear	55%	30.00
	PM	10.50	20.63	66	3S	Clear	44%	29.95
30	AM	10.63		60	5SW	Clear	76%	29.92
	PM	9.69	20.32	73	5SW	Clear	44%	29.80

654.81

TABLE 8

May-04		Milk (pounds &10th)	Total Milk Per Day	Temp	Wind	Weather	Humidity	Barometer
Phase 2								
1	AM	11.38		64	5SW	P.Cloudy	79%	29.78
	PM	9.81	21.19	70	0	Rain	83%	29.69
2	AM	10.13		68	5SW	Clear	88%	29.54
	PM	10.50	20.63		6SE	Rain	80%	29.5
3	AM	10.63		51	0	Rain	72%	29.66
	PM	9.50	20.13	52	0	Clear	77%	29.57
4	AM	11.00		51	5NW	Clear	42%	29.79
	PM	9.75	20.75	55	0	Clear	48%	29.57
5	AM	10.69		54	0	Clear	63%	29.68
	PM	10.00	20.69	72	0	Clear	45%	29.56
6	AM	10.63		54	0	Clear	68%	29.68
	PM	9.00	19.63	75	1S	Clear	55%	29.75
7	AM	12.60		60	1SW	Clear	76%	29.73
	PM	9.94	22.54	59	1SW	Rain	83%	29.69
8	AM	10.13		61	0	Clear	77%	29.54
	PM	10.75	20.88	61	3SE	Clear	53%	29.88
9	AM	9.63		60	6SW	Clear	76%	29.81
	PM	9.63	19.26	71	0	Clear	58%	29.74
10	AM	10.00		66	0	Clear	79%	29.79
	PM	9.63	19.63	83	2S	P.Cloudy	49%	29.75
11	AM	10.69		69	2SW	P.Cloudy	73%	29.82
	PM	10.70	21.39	72	0	P.Cloudy	79%	29.82
12	AM	10.06		75	2SW	Clear	62%	29.87
	PM	12.00	22.06	81	3SW	Clear	66%	29.84
13	AM	9.00		76	6SW	Clear	72%	29.87
	PM	9.00	18.00	77	2SW	Clear	63%	29.83
14	AM	9.88		69	6SW	Clear	78%	29.86
	PM	10.38	20.26	82	4SW	Clear	52%	29.81
15	AM	9.63		66	5SW	Clear	80%	29.81
	PM	10.20	19.83	80	6SW	Clear	51%	29.79
16	AM	10.44		65	0	P.Cloudy	77%	29.91
	PM	10.38	20.82	82	4SW	Clear	67%	29.92
17	AM	10.63		63	3SW	P.Cloudy	56%	29.94
	PM	9.00	19.63	75	12SW	Cloudy	62%	29.95
18	AM	11.00		62	4SW	P.Cloudy	54%	29.87
	PM	9.63	20.63	74	12SW	Rain	91%	29.85
19	AM	10.44		65	6SW	Cloudy	85%	29.77
	PM	9.38	19.82	73	0	P.Cloudy	78%	29.80
20	AM	10.19		65	3E	Rain	85%	29.89
	PM	9.63	19.82	73	0	Clear	79%	29.82
21	AM	10.13		68	5SW	Cloudy	91%	29.74
	PM	9.63	19.76	76	0	Clear	81%	29.71
22	AM	9.94		71	0	Clear	80%	29.69
	PM	9.19	19.13	86	4SW	Clear	55%	29.60
23	AM	10.13		77	3SW	Clear	75%	29.59
	PM	9.63	19.76	87	1SW	Clear	70%	29.55
24	AM	9.50		70	4SW	Clear	81%	29.56
	PM	10.38	19.88	79	4SW	Clear	65%	29.51
25	AM	9.00		71	4SW	Clear	55%	29.57
	PM	10.06	19.06	81	6NW	Cloudy	55%	29.51
26	AM	9.13		69	0	Rain	81%	29.49
	PM	9.94	19.07	77	0	Rain	75%	29.41
27	AM	9.31		72	0	Clear	83%	29.41
	PM	8.63	17.94	80	3SW	Clear	59%	29.39
28	AM	9.13		68	0	Cloudy	89%	29.39
	PM	10.13	19.26	65	6N	Rain	83%	29.4
29	AM	10.13		58	1NW	Clear	71%	29.62
	PM	9.38	19.51	63	0	Clear	66%	29.7
30	AM	9.94		61	0	Cloudy	78%	29.63
	PM	9.13	19.07	67	0	Rain	79%	29.55
31	AM	9.63		68	0	Cloudy	87%	29.29
	PM	9.00	18.63	73	0	Cloudy	84%	29.29

TABLE 9

June-04		Milk (pounds &10th)	Total Milk Per Day	Temp	Wind	Weather	Humidity	Barometer
PHASE 2								
1	AM	9.50		72	1NW	Clear	74%	29.42
	PM	9.38	18.88	71	1NW	Clear	48%	29.49
2	AM	8.63		62	2SW	P.Cloudy	66%	29.50
	PM	8.38	17.01	72	0	Clear	50%	29.59
3	AM	10.63		67	2SW	Clear	66%	29.73
	PM	9.19	19.82	77	0	Clear	58%	29.77
4	AM	8.63		63	1N	Rain	79%	29.85
	PM	8.66	17.29	63	0	Rain	83%	29.75
5	AM	8.81		58	4NW	Rain	87%	29.63
	PM	9.94	18.75	59	1NW	Cloudy	85%	29.72
6	AM	7.50		69	0	Clear	85%	29.72
	PM	8.38	15.88	71	4SE	Cloudy	70%	29.72
7	AM	9.00		65	0	Cloudy	85%	29.82
	PM	8.38	17.38	71	0	Clear	85%	29.86
8	AM	8.88		70	2SW	Cloudy	88%	29.92
	PM	8.31	17.19	81	0	Clear	65%	29.84
9	AM	9.00		71	0	Clear	85%	29.82
	PM	10.00	19	78	2SW	Clear	60%	29.68
10	AM	8.63		72	0	Clear	60%	29.62
	PM	8.19	16.82	72	0	Rain	84%	29.68
11	AM	8.44		69	0	P.Cloudy	83%	29.56
	PM	8.56	17	67	3E	Rain	84%	29.54
12	AM	8.19		63	3N	P.Cloudy	80%	29.78
	PM	8.13	16.32	71	0	Clear	72%	29.80
13	AM	8.60		62	0	Cloudy	63%	29.88
	PM	8.31	16.91	68	4SW	Cloudy	68%	28.78
14	AM	8.81		70	0	Cloudy	78%	29.65
	PM	8.31	17.12	78	5SW	Clear	78%	29.65
15	AM	8.38		73	2SW	Cloudy	84%	29.73
	PM	8.31	16.69	78	0	Rain	82%	29.75
16	AM	9.75		75	0	Cloudy	87%	29.80
	PM	7.63	17.38	82	0	Cloudy	76%	29.74
17	AM	9.00		73	2SW	Rain	92%	29.73
	PM	8.50	17.5	81	0	Clear	78%	29.64
18	AM	9.00		78	3SW	Clear	75%	29.63
	PM	8.19	17.19	81	0	Clear	74%	29.59
19	AM	8.63		72	0	Clear	80%	29.63
	PM	8.38	17.01	72	0	Clear	68%	29.65
20	AM	8.19		61	3N	Clear	54%	29.79
	PM	9.81	18	65	0	Clear	68%	29.71
21	AM	7.88		61	0	Clear	78%	29.71
	PM	8.88	16.76	75	3SW	P.Cloudy	67%	29.59
22	AM	8.81		70	2SW	P.Cloudy	78%	29.54
	PM	8.44	17.25		0	P.Cloudy	87%	29.54
23	AM	7.69		72	0	Cloudy	90%	29.54
	PM	8.69	16.38	73	1NE	Cloudy	74%	29.68
24	AM	8.00		70	0	Clear	84%	29.70
	PM	7.81	15.81	78	0	Clear	73%	29.74
25	AM	7.88		73	0	Clear	70%	29.70
	PM	8.13	16.01	75	0	Cloudy	76%	29.64
26	AM	7.69		68	0	Rain	89%	29.54
	PM	8.81	16.5	77	0	Clear	80%	29.69
27	AM	8.50		57	0	Clear	81%	29.82
	PM	8.50	17	74	0	Clear	59%	29.78
28	AM	8.63		65	0	Clear	74%	29.76
	PM	7.50	16.13	80	0	Clear	62%	29.66
29	AM	7.50		65	0	Clear	70%	29.79
	PM	7.50	15	69	0	Clear	69%	29.8
30	AM	7.88		66	0	Clear	69%	29.82
	PM	7.44	15.32	83	0	Clear	59%	29.81

511.3

TABLE 10

July-04		Milk (pounds &10th)	Total Milk Per Day	Temp	Wind	Weather	Humidity	Barometer
1	AM	7.81		67	0	Clear	88%	29.81
	PM	7.50	15.31	84	0	Cloudy	60%	29.84
2	AM	8.00		67	0	Clear	82%	29.74
	PM	7.88	15.88	85	0	Clear	60%	29.64
3	AM	8.38		68	0	Clear	83%	29.63
	PM	7.63	16.01	69	0	Clear	88%	29.63
4	AM	8.50		74	0	Rain	83%	29.65
	PM	7.63	16.13	76	0	Rain	78%	29.53
5	AM	8.63		70	0	Clear	91%	29.58
	PM	7.75	16.38	79	0	Clear	78%	29.58
6	AM	8.13		76	0	Clear	78%	29.66
	PM	7.75	15.88	74	0	Rain	85%	29.60
7	AM	8.38		76	0	Cloudy	83%	29.56
	PM	8.50	16.88	71	4SW	Rain	85%	29.50
8	AM	8.06		71	0	Clear	89%	29.56
	PM	8.94	17.00	80	0	Clear	64%	29.59
9	AM	8.50		73	0	Clear	74%	29.71
	PM	7.94	16.44	81	0	Clear	75%	29.71
10	AM	8.75		75	0	Clear	67%	29.82
	PM	7.88	16.63	78	0	Clear	76%	29.75
11	AM	8.69		78	0	Clear	87%	29.79
	PM	8.63	17.32	84	0	Clear	67%	29.72
12	AM	8.94		74	2SW	Clear	84%	29.71
	PM	7.75	16.69	78	0	Rain	83%	29.54
13	AM	8.50		73	0	Clear	86%	29.52
	PM	8.44	16.94	82	4SW	Rain	89%	29.45
14	AM	7.63		73	0	Clear	87%	29.38
	PM	7.56	15.19	72	0	Rain	89%	29.30
15	AM	8.75		71	2SW	Clear	73%	29.37
	PM	7.75	16.5	79	0	Clear	52%	29.42
16	AM	8.63		71	0	Clear	68%	29.48
	PM	7.63	16.26	82	0	Clear	53%	29.48
17	AM	9.00		69	0	Clear	77%	29.56
	PM	8.63	17.63	73	4SW	Cloudy	77%	29.55
18	AM	8.25		68	0	Cloudy	87%	29.52
	PM	7.69	15.94	75	2NE	P.Cloudy	75%	29.47
19	AM	9.19		67	0	Cloudy	84%	29.52
	PM	8.31	17.5	78	0	Cloudy	72%	29.49
20	AM	8.11		62	0	Clear	86%	29.61
	PM	7.31	15.42	85	0	Clear	48%	29.63
21	AM	8.69		69	0	Clear	85%	29.69
	PM	7.44	16.13	85	0	Clear	76%	29.64
22	AM	8.75		75	0	P.Cloudy	76%	29.60
	PM	8.31	17.06	77	0	Rain	88%	29.45
23	AM	8.56		71	0	Cloudy	89%	29.56
	PM	7.19	15.75	81	0	Cloudy	73%	29.57
24	AM	7.94		70	3NE	Cloudy	86%	29.77
	PM	7.56	15.50	73	2N	Cloudy	72%	29.85
25	AM	9.00		67	1N	Rain	86%	29.88
	PM	7.00	16.00	65	1N	Rain	87%	29.88
26	AM	8.56		69	0	Rain	89%	29.81
	PM	6.94	15.50	74	1SE	Rain	88%	29.71
27	AM	6.19		72	0	Rain	91%	29.64
	PM	10.94	17.13	75	0	Rain	86%	29.63
28	AM	5.88		73	0	Cloudy	90%	29.66
	PM	7.75	13.63	81	0	Clear	73%	29.66
29	AM	7.69		68	9	Clear	79%	29.77
	PM	6.94	14.63	85	2E	Clear	59%	29.71
30	AM	9.06		72	4SW	Cloudy	88%	29.77
	PM	7.25	16.31	84	3SW	Clear	63%	29.73
31	AM	8.50		75	1SW	Cloudy	86%	29.77
	PM	6.63	15.13	82	0	Clear	72%	29.70

500.70

TABLE 11

August-04		Milk (pounds &10th)	Total Milk Per Day	Temp	Wind	Weather	Humidity	Barometer
Phase 2								
1	AM	8.81		75	4SW	Clear	89%	29.74
	PM	6.63	15.44	78	4SW	Clear	80%	29.70
2	AM	7.13		72	0	Cloudy	90%	29.67
	PM	6.88	14.01	74	3SE	Rain	84%	29.64
3	AM	6.94		72	0	Cloudy	90%	20.56
	PM	6.88	13.82	86	0	Clear	66%	29.46
4	AM	7.88		77	0	Clear	79%	29.51
	PM	6.88	14.76	82	1S	Clear	69%	29.42
5	AM	8.06		73	0	P. Cloudy	86%	29.43
	PM	6.81	14.87	71	0	P. Cloudy	85%	29.47
6	AM	6.60		61	3NW	Clear	73%	29.59
	PM	8.00	14.6	70	1NW	Clear	73%	29.61
7	AM	7.75		56	0	Clear	79%	29.64
	PM	6.31	14.06	72	0	Clear	75%	29.74
8	AM	9.19		63	0	P.Cloudy	79%	29.83
	PM	8.13	17.32	73	0	Clear	74%	29.83
9	AM	9.50		68	1SE	Clear	78%	29.84
	PM	9.80	19.30	75	0	Clear	70%	29.77
10	AM	7.50		70	1SW	Clear	77%	29.72
	PM	7.88	15.38	76	4SW	Clear	70%	29.63
11	AM	7.69		71	1SW	P.Cloudy	79%	29.60
	PM	7.69	15.38	77	4SW	P.Cloudy	71%	29.57
12	AM	7.75		72	1SW	P.Cloudy	80%	29.62
	PM	7.00	14.75	76	0	Rain	80%	29.58
13	AM	7.88		71	0	P.Cloudy	85%	29.59
	PM	6.88	14.76	75	4NW	Cloudy	66%	29.67
14	AM	7.44		68	5NW	Cloudy	88%	29.73
	PM	7.94	15.38	65	0	Cloudy	88%	29.8
15	AM	7.63		66	1NW	P.Cloudy	80%	29.91
	PM	6.69	14.32	76	0	Clear	69%	29.90
16	AM	8.13		74	1SE	Clear	56%	29.86
	PM	6.60	14.73	83	0	Clear	51%	29.84
17	AM	7.89		73	0	Clear	55%	29.79
	PM	6.75	14.64	80	0	Clear	60%	29.71
18	AM	7.63		73	1S	Clear	66%	29.70
	PM	6.81	14.44	80	3S	Clear	68%	29.68
19	AM	7.50		72	2SW	Cloudy	88%	29.68
	PM	7.25	14.75	81	4NW	Rain	88%	29.75
20	AM	7.94		76	0	Clear	87%	29.73
	PM	6.44	14.38	83	4SW	Clear	69%	29.63
21	AM	7.50		75	6SW	Cloudy	80%	29.53
	PM	7.21	14.71	73	0	P.Cloudy	78%	29.69
22	AM	6.50		61	0	Clear	82%	29.75
	PM	7.12	13.62	79	0	Clear	76%	29.71
23	AM	7.63		76	3SW	Clear	83%	29.72
	PM	6.38	14.01	84	0	Clear	57%	29.70
24	AM	8.38		77	0	Clear	50%	29.80
	PM	6.00	14.38	81	0	Clear	65%	29.82
25	AM	7.94		66	0	Cloudy	83%	29.90
	PM	6.50	14.44	80	0	P. Cloudy	64%	29.90
26	AM	7.63		65	0	Cloudy	88%	29.87
	PM	7.00	14.63	83	1SW	Clear	56%	29.84
27	AM	7.50		72	5SW	Cloudy	87%	29.88
	PM	6.50	14.00	82	0	Clear	74%	29.78
28	AM	7.94		72	0	Clear	84%	29.73
	PM	6.63	14.57	87	5SW	Clear	58%	29.63
29	AM	8.38		74	1SW	Clear	84%	29.64
	PM	6.31	14.69	84	0	Clear	64%	29.60
30	AM	8.38		74	0	Clear	86%	29.64
	PM	6.31	14.69	76	3N	Rain	84%	29.53
31	AM	8.25		71	0	Clear	82%	29.73
	PM	6.50	14.75	86	0	Clear	56%	29.77

459.58

TABLE 12

September-04		Milk (pounds &10th)	Total Milk per day	Temp	Wind	Weather	Humidity	Barometer
Phase 2								
1	AM	8.13		64	0	P.Cloudy	82%	29.87
	PM	6.38	14.51	76	0	P.Cloudy	71%	29.86
2	AM	7.94		63	2N	Clear	81%	29.90
	PM	6.38	14.32	81	0	Clear	57%	29.88
3	AM	8.38		66	3NE	Cloudy	85%	29.91
	PM	6.60	14.98	82	0	Cloudy	83%	29.89
4	AM	8.60		67	0	Clear	81%	29.85
	PM	6.19	14.79	83	0	Clear	81%	28.85
5	AM	7.38		64	0	Clear	83%	29.87
	PM	6.12	13.50	78	0	Rain	82%	29.89
6	AM	7.25		65	2N	Rain	84%	29.90
	PM	6.06	13.31	71	0	Rain	89%	29.80
7	AM	7.25		70	0	Rain	89%	29.75
	PM	6.19	13.44	75	0	Rain	85%	29.69
8	AM	6.63		69	6SE	Rain	90%	29.55
	PM	6.13	12.76	76	9SE	Rain	88%	29.42
9	AM	6.19		73	6SW	Rain	88%	29.42
	PM	6.24	12.43	77	1NW	P.Cloudy	59%	29.63
10	AM	6.94		63	0	Clear	83%	29.84
	PM	6.25	13.19	83	0	Clear	57%	29.82
11	AM	7.69		65	0	P.Cloudy	78%	29.92
	PM	6.13	13.82	82	0	P.Cloudy	83%	29.90
12	AM	7.63		67	0	P.Cloudy	86%	29.90
	PM	5.94	13.57	80	0	Clear	60%	29.82
13	AM	7.69		68	0	Clear	86%	29.88
	PM	7.25	14.94	79	0	Clear	79%	29.89
14	AM	7.25		64	0	Cloudy	84%	29.89
	PM	7.00	14.25	72	0	Cloudy	83%	29.91
15	AM	7.50		67	1NE	Rain	88%	29.89
	PM	6.13	13.63	72	0	Cloudy	89%	29.82
16	AM	7.94		67	0	Cloudy	90%	29.79
	PM	6.44	14.38	70	3SW	Cloudy	88%	29.70
17	AM	7.75		70	5SE	Cloudy	69%	29.58
	PM	6.13	13.88	76	6SW	Rain	88%	29.30
18	AM	6.44		65	8N	Rain	88%	29.30
	PM	6.63	13.07	67	6NW	P.Cloudy	46%	29.63
19	AM	7.88		58	5NE	Clear	57%	29.90
	PM	6.00	13.88	71	4NE	Clear	42%	29.89
20	AM	7.63		54	4NW	Clear	73%	30.06
	PM	6.63	14.26	71	0	Clear	55%	29.98
21	AM	8.13		55	0	Clear	81%	29.97
	PM	6.50	14.63	72	0	Clear	70%	29.95
22	AM	7.94		59	0	Clear	80%	29.93
	PM	6.81	14.75	75	0	Clear	58%	29.87
23	AM	7.94		70	0	Clear	56%	29.92
	PM	6.50	14.44	87	0	Clear	43%	29.87
24	AM	7.50		63	0	Cloudy	86%	29.90
	PM	5.88	13.38	81	6SE	Clear	48%	29.87
25	AM	8.50		57	0	Clear	80%	29.82
	PM	5.13	13.63	78	0	Clear	57%	29.76
26	AM	8.60		70	7NE	Clear	76%	29.80
	PM	7.94	16.54	69	0	P.Cloudy	77%	29.80
27	AM	7.50		61	0	P.Cloudy	84%	29.78
	PM	6.31	13.81	69	0	Rain	86%	29.64
28	AM	7.63		67	0	Rain	90%	29.51
	PM	6.31	13.94	65	5NE	Rain	90%	29.49
29	AM	7.15		61	2N	Clear	69%	29.60
	PM	6.50	13.65	75	0	P.Cloudy	66%	29.61
30	AM	9.38		65	0	P.Cloudy	85%	29.74
	PM	6.63	16.01	69	0	P.Cloudy	74%	29.76

421.69

GLOSSARY

ADGA	American Dairy Goat Association TO READ MORE - www.adga.org/
AGS	American Goat Society TO READ MORE - www.americangoatsociety.com/
BREEDING SEASON	The period when goats will be breed, usually September through December. With Nigerian Dwarfs this period can be any time during the year.
BUCK	Male goat
BROWSE	To eat bushy or woody plants.
BUTTERFAT	The fat within milk or milk products. For Nigerians Dwarfs this can range from 6% to 11%.
DHIA	Dairy Herd Improvement Association. A program administered by the USDA to test and record milk production. TO READ MORE - www.dhia.org/
DOE	Female goat
FRESHEN	To give birth and come into milk.
GOAT SHARES	You sell shares of your milking does. Shareholders pay a monthly room and board fee and they are entitled to raw milk. TO READ MORE - realmilk.com/cowfarmshare.html
HARD CHEESE	Cheese that is firm or hard in texture. These cheeses are aged for a minimum of 60 days or more to develop the flavor.
HAY	Edible dry forage.
HOMOGENIZATION	A mechanical process that breaks up the butterfat globules in the milk so they will be evenly dispersed and the cream will not rise to the top. Goat's milk is naturally homogenized because its butterfat globules are much smaller that of a cow. TO READ MORE: www.westonaprice.org/knowyourfats/homogenization.htm www.westonaprice.org/transition/dairy.html realmilk.com/homogenization.html
LACTATION	The period of time in which a goat is producing milk.
NDGA	Nigerian Dwarf Goat Association TO READ MORE - www.ndga.org/

PASTEURIZATION	Heating milk to 161 degrees for 15 seconds to destroy naturally occurring bacteria--the good ones as well as the bad. TO READ MORE - realmilk.com/indexpage.html
RAW MILK	Milk as it comes from the goat, with nothing done to it. TO READ MORE - realmilk.com
REGISTERED	To record the birth and ancestry of a goat with a registry association.
ROTATIONAL GRAZING	Moving the goats from one small pasture to another. This prevents overgrazing and gives the plants time for renewed growth. TO READ MORE - www.attra.org/attrapub/rotategr.html
SARE GRANT	A competitive grants program providing grants to researchers, agricultural educators, farmers and ranchers, and students in the United States. TO READ MORE - www.sare.org/grants/
SOMATIC CELL COUNT	Measure of the white blood cells in the milk. Excessive amounts indicate an infection. TO READ MORE - edis.ifas.ufl.edu/DS120
STAR MILKER	Designation of high milk production. Based on DHI tests, stars are awarded by the goat associations. TO READ MORE www.americangoatsociety.com/star_production_awards.htm
STRAW	Non-edible dried plant matter used as bedding.
VSDGA	Virginia State Dairy Goat Association TO READ MORE - www.vsdga.org/
WETHER	Castrated buck.
WHEY	The liquid that remains when curd is removed from the milk for cheese making.

More Information

All About Nigerian Dwarf Dairy Goats (including care)

Kush-Hara Farm www.kushhara.com

Cornerstone Farm www.cornerstonefarm.net/gtcareof.html

Goat Web www.goatweb.com/discover/miniature/nigerian/index.shtml

OK State University www.ansi.okstate.edu/breeds/goats/nigeriandwarf/

ANDDA www.andda.org/BreedHistory.htm

Associations

American Dairy Goat Association: www.adga.org/

American Goat Association: www.americangoatsociety.com/

Nigerian Dwarf Goat Association: www.ndga.org/

Virginia State Dairy Goat Association: www.vsdga.org/

Grants

SARE www.sare.org/grants/

Value-added Producer Grant www.rurdev.usda.gov/rbs/coops/vadg.htm

Magazines

Dairy Goat Journal: www.dairygoatjournal.com/

Supplies

Caprine Goat Supply: www.caprinesupply.com/

Countryside Natural Products www.countrysidenatural.com/

Hoegger Goat Supply: www.thegoatstore.com/

New England Cheesemaking: www.cheesemaking.com/

Virginia Dairy Information & Regulations

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