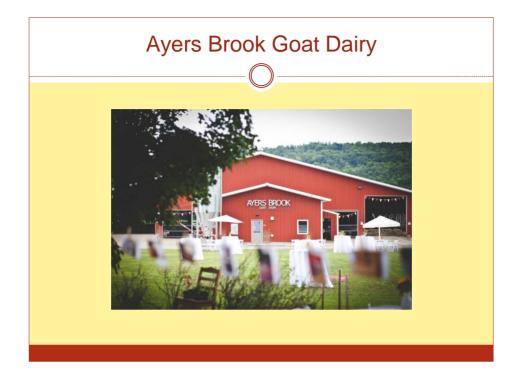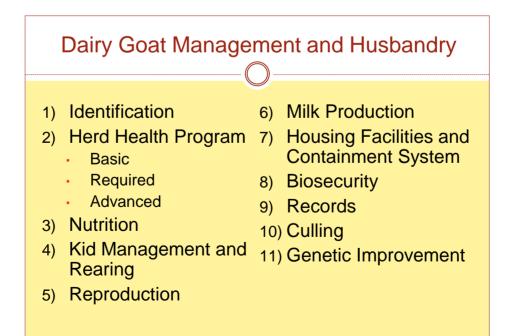# ADVANCED DAIRY GOAT MANAGEMENT

RENE' DELEEUW
AYERS BROOK GOAT DAIRY

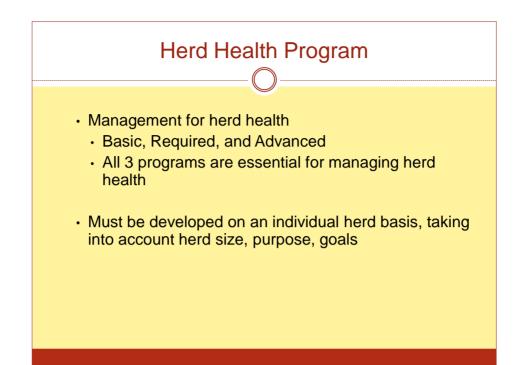## Background: Ayers Brook Goat Dairy

- In 2012, the Vermont Creamery, one of the leading US artisanal cheesemakers teamed with the Castanea Foundation to establish the first model educational goat dairy in the United States, Ayers Brook Goat Dairy.

- The 100 acre farm is designed to support the growth of the region's dairy goat industry through development of best practices in goat dairy management. Our farm boasts a 22,000 sq. ft dairy barn, a state of the art rapid exit milking parlor, and Vermont's largest roof-mounted solar array.

- In 2013, Ayers Brook Goat Dairy began with a foundation herd of 116 goats. By the end of the year, we were able to realize a herd of 200 milking does.

Ayers Brook Goat Dairy

Dairy Goat Management and Husbandry

1) Identification
2) Herd Health Program
   - Basic
   - Required
   - Advanced
3) Nutrition
4) Kid Management and Rearing
5) Reproduction
6) Milk Production
7) Housing Facilities and Containment System
8) Biosecurity
9) Records
10) Culling
11) Genetic Improvement

Identification

- Options
  - Ear Tags
    - Metal or plastic
      - Scrapie program mandate or volunteer
  - Tattoos
    - Individual
    - Farm
    - Country for some export markets
  - Neck tags
  - Ankle tags w RFID
  - Microchips

Ankle tag with RFID

Herd Health Program

- Management for herd health
  - Basic, Required, and Advanced
  - All 3 programs are essential for managing herd health

- Must be developed on an individual herd basis, taking into account herd size, purpose, goals

Basic Herd Health Program

- Target areas
  - Parasite control
  - Foot Rot
  - Pinkeye
  - Udder health and mastitis
  - Contagious Ecthyma
  - Coccidiosis
  - Maintain 2:1 dietary Ca/P ratio
  - Skin disease freedom
  - Drug residue avoidance

- Vaccinations
  - Clostridium perfringens C&D, Tetanus
  - Chlamydia
  - Based on vet-producer agreement
- Test Results
- Herd Health Records
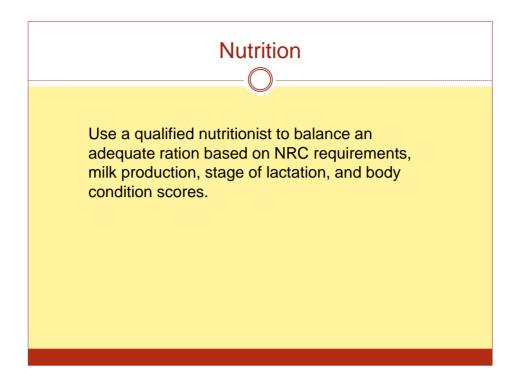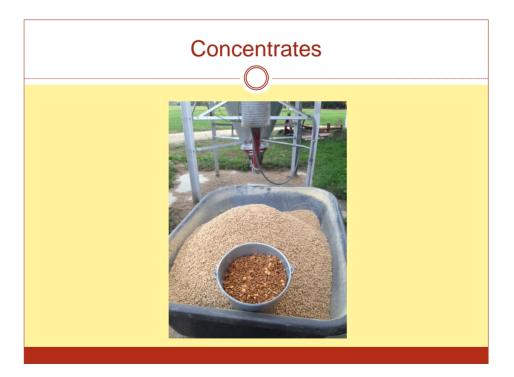
Required Levels of Health Assurance

- Brucellosis Annual Herd Testing
  - Obtain certified free status depending on state and monitoring
- TB Annual Herd Testing
  - Obtain certified free status depending on state and monitoring
- Scrapie
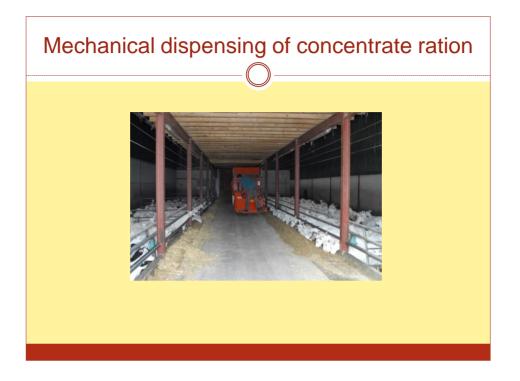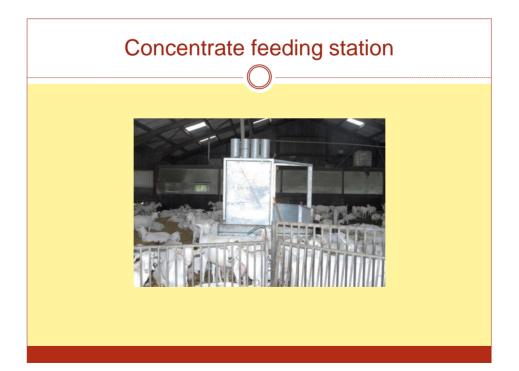 - Follow standards of the USDA/Aphis Scrapie Flock Certification Program

Advanced Levels of Herd Health Program

- Must consider participation in all or a combination of the following:
  - Johnes
  - Caseous Lymphadenitis (CL)
  - CAEV
    - Segregate positive does to avoid horizontal transmission
    - Milk CAEV negative does first
    - Heat treat colostrum and milk
  - Toxoplasmosis
  - Infectious abortions
  - Mycoplasma

Nutrition

Use a qualified nutritionist to balance an adequate ration based on NRC requirements, milk production, stage of lactation, and body condition scores.

Nutrition

Fresh and Clean Water!!!

Baleage, chopped forage in ag bag (haylage)

Concentrates

Mechanical dispensing of concentrate ration

Concentrate feeding station

Total Mixed Ration (TMR)

Baleage

Ad Lib Baleage

Dry hay

Minerals

Body Condition Scoring

Body Score	Body Condition Scoring
1	No flesh covering ribs, sharpness to vertebrae and pin bones
2	Very little flesh covering ribs and heart girth/part of shoulder area, vertebrae easy to delineate along back
3	Adequate amount of flesh over ribs and heart girth/part of shoulder area, vertebrae can be delineated along back
3.5	Somewhat more fleshed out than 3
4	More flesh over ribs, with some extra flesh in heart girth/part of shoulder area, little to no delineation of vertebrae along back
5	Considerable fleshing over ribs, "handful" in heart girth/part of shoulder area, no delineation of vertebrae along back – is rounded
6	Obese, excess fleshing all over body frame, handfuls visible in heart girth/part of shoulder area, topline is completely blended with sides and abdomen, candidate for fat goat syndrome

Kid Management and Rearing
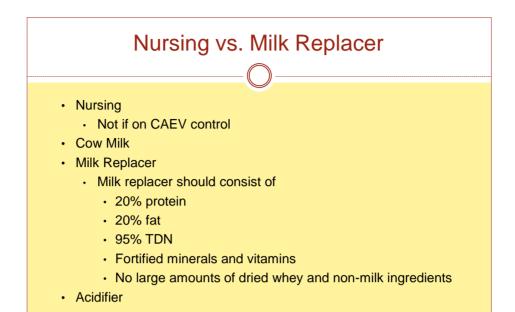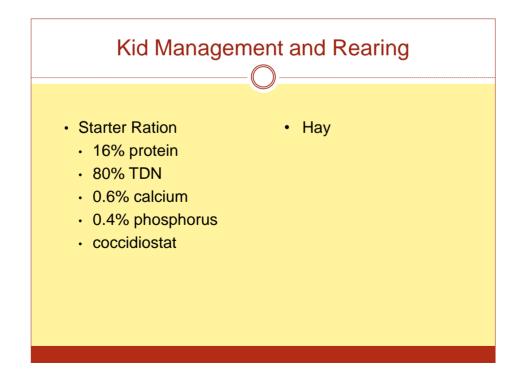
Kid Management and Rearing

- CAEV Prevention Program
  - Remove kids from dam at birth
  - Feed heat-treated colostrum, then pasteurized milk, or milk replacer
  - Routine serologic testing
  - Segregation of positive kids
  - Avoid horizontal transmission
  - Avoid iatrogenic transmission

Kid Feeding, Care and Vaccination Schedule

Day 1	FIRST TWO FEEDINGS SHOULD BE COLOSTRUM MIN 8-10 oz PER FEEDING
Day 3-4	WHEN KID IS EATING WELL AND GRABS NIPPLE BY ITSELF, PUT IN CRIB OR HUTCH. HELP KID NURSE UNTIL IT EATS ON ITS OWN. MAXIMUM MILK FED : 1 PT PER KID MULTIPLE FEEDINGS OR AD LIB 24/7 OFFER KIDS STARTER GRAIN AND WATER FROM FIRST DAY IN CRIB.
1 week	C&D TETANUS
10 days - 2 weeks	DISBUD, CHECK TEATS, TATTOO
3 weeks	BOSE (If herd indicated)
4 weeks	START HAY
5 weeks	WEIGH, C&D, DECREASE MILK OR MR
6 weeks	COCCIDIOSTAT IN MILK OR MR
7 weeks	WEIGH, WEAN IF EXCEED AGE AND WEIGHT

Nursing vs. Milk Replacer

- Nursing
  - Not if on CAEV control
- Cow Milk
- Milk Replacer
  - Milk replacer should consist of
    - 20% protein
    - 20% fat
    - 95% TDN
    - Fortified minerals and vitamins
    - No large amounts of dried whey and non-milk ingredients
- Acidifier

Kid Management and Rearing

- Starter Ration
  - 16% protein
  - 80% TDN
  - 0.6% calcium
  - 0.4% phosphorus
  - coccidiostat

- Hay

Lambar

Mechanical Kid Feeder

Kid crib

Kid Management and Rearing

- Weaning Parameters
  - Must be both 7 weeks old and at least 23 pounds body weight.
  - If not, hold over on limited milk replacer until kid weighs 23 pounds.

Reproduction

Reproduction

- Breeding
  - Yearling
  - Mature
  - Replacement

Reproduction

```
                    ┌─────────────┐
                    │   Breeding  │
                    └──────┬──────┘
          ┌────────────────┼────────────────┐
   ┌──────────────┐ ┌──────────────┐ ┌──────────────┐
   │  Artificial  │ │ Hand Mating  │ │ Pen Breeding │
   │ Insemination │ │              │ │              │
   └──────────────┘ └──────────────┘ └──────────────┘
```

Breeding - Artificial Insemination

- Allows for many progeny from superior males
- Allow semen to be used in geographically diverse locations
- When used in large herds on milk test increases the sire summaries proofs

Pen mating or hand mating

Reproduction

- Estrus Synchronization
  - In breeding season
    - Surprise them!!!!
  - Out of season breeding and advancement of breeding season
    - Lights
    - Hormonal

Out of season breeding

- Lights (refer to handout for details)
  - Materials
    - Enclosed barn or space
    - Bright light
  - Procedure
    - 20 hour light day for 60-65 days
  - Results
    - Early bred groups (Feb-Mar-Apr) 91%
    - Early bred groups + May 87%
    - All groups (Feb-June) 78%

Estrus Synchronization - Hormonal

Reproduction

Collect your bucks for security

Use strategy in buck use!

- Use young bucks for most breedings
- Replace bucks quickly
- Bank semen of young bucks
- Use frozen semen from superior proven bucks as sires of next generation of young bucks

Ultrasound Pregnancy Determination

Milk Production

Averages of DHI goat herds

AVERAGES of DHI GOAT HERDS by BREED, 2003

HERD BREED	Herd N=	Doe Years N=	MILK LBS.	BUTTERFAT %/ lbs	PROTEIN %/ lbs
ALPINE	65	1682	2083	3.5/ 73	2.9/ 61
LAMANCHA	38	553	1687	3.7/ 63	3.1/ 52
NUBIAN	96	1324	1496	4.6/ 69	3.6/ 54
OBERHASLI	19	190	1472	3.7/ 55	2.9/ 43
SAANEN	32	684	1921	3.5/ 68	2.9/ 56
TOGGENBURG	22	341	1852	3.3/ 61	2.9/ 53

Based on 2003 USDA DHI Herd Records of those herds comprised of 75% of a single breed
Mixed breed & Experimental Herd data available at AIPL

ADGA DHIR Breed Averages

Averages of DHI Goat Herds by Breed, 2013

AVERAGES of DHI GOAT HERDS by BREED, 2013

HERD BREED	Herd N=	Doe Years N=	MILK lbs.	BUTTERFAT lbs	PROTEIN lbs
ALPINE	62	1984	2031	69	59
LAMANCHA	32	484	2191	85	67
NUBIAN	76	1109	1510	69	56
OBERHASLI	13	283	1531	51	42
SAANEN	26	1649	2247	82	65
TOGGENBURG	9	112	1646	52	45

Based on 2013 USDA DHI Herd Records of those herds comprised of 75% of a single breed.

ADGA Breed Averages – 2013 Lactations

ADGA BREED AVERAGES – 2013 LACTATIONS

DOES 275-305 DAYS in MILK	N=	AVG. AGE at START of LACTATION	MILK lbs	RANGE	B-FAT % / lbs	PROTEIN % / lbs	ECM* lbs
ALPINE	487	3y5m	2559	890-5280	3.3 / 85	2.9 / 73	2496
LAMANCHA	250	2y6m	2171	700-4030	3.7 / 81	3.1 / 66	2264
NIGERIAN DWARF	215	3y6m	719	270-1630	6.3 / 45	4.3 / 31	1055
NUBIAN	391	2y6m	1964	530-3710	4.6 / 90	3.7 / 73	2366
OBERHASLI	52	2y6m	1963	990-3870	3.7 / 72	2.9 / 58	2018
SAANEN	494	3y5m	2613	850-5490	3.3 / 86	2.8 / 74	2534
SABLE	30	2y5m	2222	1350-3170	3.5 / 76	2.8 / 62	2185
TOGGENBURG	122	3y5m	2163	910-4160	3.1 / 67	2.7 / 59	2026

Based on 2013 ADGA DHIR Individual Doe Records not corrected for age   ** ECM = Energy Corrected Milk*

Get buck yield and type evaluations
Data entry online

Enter **buck breed** and **ID number** (e.g., **S180779113**). The leading zeros can be omitted (e.g., **L944014**):

[ ]

Submit   aipl-250

Return to Query Selection Page

Get buck yield and type evaluations by name
Data entry online

Enter **buck name** (**full** or **partial**) to query (i.e. **choc** OR **chocolate**):

[ ]

Submit

Return to Query Selection Page

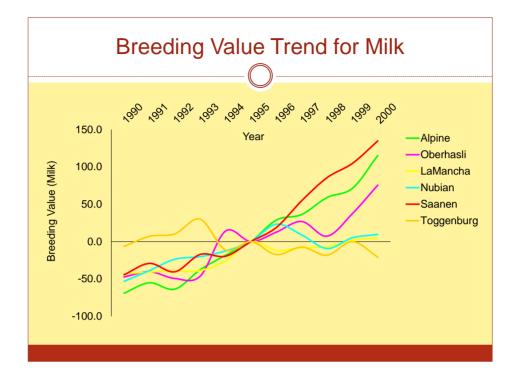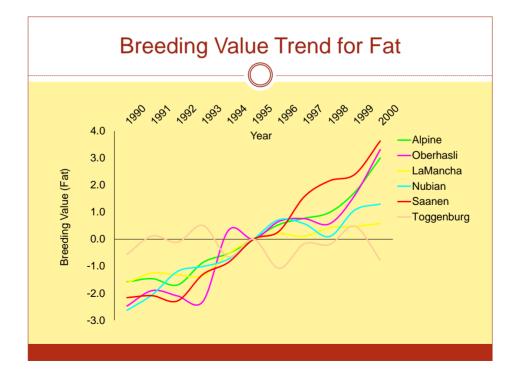## Codes for dairy goat breeds for which USDA genetic evaluations are available:

Breed	1-Letter Code	2-Letter Code
Alpine	A	AI
Oberhasli	B	OH
Experimental	E	EX
LaMancha	L	LN
Nubian	N	NU
Saanen	S	EN
Toggenburg	T	TO

Get goat herd test-day information
Data entry online

Enter **herd ID number** (e.g., **51200211**):

51200211

Submit   aipl-250

Return to Query Selection Page

Output from "Get goat **herd** test-day information"

Includes data from the year preceding the last test.

```
51200211
Date     Ctr DHI Does Freq Weig Spl MRD Supv Sp Br Updated Plan Md QC %Sh G ID  Milk Fat Prot SCS Age In file
20020904 10 021  46   2    2   2   1   1    1 AI 20020913 20  1  1   0  82  2229  75   59  4.5  37    43
20021009 10 021  42   2    2   2   1   1    1 AI 20021014 20  1  1   0  81  2213  75   59  4.4  37    36
20021103 10 021  38   2    2   2   1   1    1 AI 20021112 20  1  1   0  80  2183  74   59  4.5  38    35
20021201 10 021  35   2    2   2   1   1    1 AI 20021204 20  1  1   0  80  2158  73   58  4.4  38    32
20030101 10 021  19   2    2   2   1   1    1 AI 20030106 20  1  1   0  84  2093  71   56  4.5  38    18
20030205 10 021   5   2    2   2   1   1    1 AI 20030212 20  1  1   0  84  2017  69   54  4.4  38     5
20030305 10 021  26   2    2   2   1   1    1 XX 20030401 20  1  1   0  84  2040  70   55  4.3  41    26
20030406 10 021  50   2    2   2   1   1    1 XX 20030410 20  1  1   0  87  2052  71   55  4.3  38    49
20030509 10 021  57   2    2   2   1   1    1 AI 20030610 20  1  1   0  87  2085  73   56  4.3  37    56
20030604 10 021  61   2    2   2   1   1    1 XX 20030610 20  1  1   0  86  2085  73   56  4.4  38    56
20030624 10 021  59   2    2   2   1   1    1 XX 20030703 20  1  1   0  85  2097  74   56  4.4  37    55
20030807 10 021  58   2    2   2   1   1    1 XX 20030819 20  1  1   0  85  2144  75   57  4.5  37    54
20030902 10 021  58   2    2   2   1   1    1 XX 20030910 20  1  1   0  85  2155  76   57  4.6  36    53
```

Breeding Value Trend for Milk

Breeding Value Trend for Fat

Breeding Value Trend for Protein

Legend:
- Alpine
- Oberhasli
- LaMancha
- Nubian
- Saanen
- Toggenburg

X-axis (Year): 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000

Y-axis (Breeding Value (Protein)): 4.0, 3.0, 2.0, 1.0, 0.0, -1.0, -2.0, -3.0

Milk Production

- Planning based on market demand
  - Seasonal vs. year round
  - 305 DIM vs. Extended

Management

- Pre and Post-dipping Milking Procedure
  - Clean teats as necessary
  - Observe the fore milk
  - Completely coat each teat to the base of the udder with an effective teat disinfectant
  - Wipe dry with individual towel
  - Attach unit or hand milk
  - Adjust unit to minimize liner slip
  - Shut off vacuum then remove unit
  - Coat teat with post milking disinfectant
  - Determine the most effective strategy for milk let down

Milking Systems

SIDE-BY-SIDE

TANDEM

DOUBLE HERRINGBONE

ROTARY TANDEM

ROTARY HERRINGBONE

Milking parlor arrangements.

Rapid Exit Parallel parlor

Milking Systems

Carousel parlor

Milk Production

- Somatic cell counts
  - Legal Limits
    - Goats: 1,500,000 cells/mL
    - Vermont Creamery 1,000,000 cells/mL
    - Cows and Sheep: 750,000 cells/mL
  - Secretion Systems
    - Goats: Apocrine
    - Cows: Merocrine

Somatic Cell Counts

- Reasons for High SCC
  - Stress
  - Stage of Lactation
  - Onset of Estrus
  - Regional Climate
  - Housing
  - Illness
  - Intramammary infection or mammary tissue damage

Housing Facilities
& Containment Systems

Naturally ventilated curtain barn with solar

Hoop Barn

Biosecurity

Records/Information Management

Culling

Biosecurity

- Agents of concern
  - Bacteria
  - Viruses
  - Parasites
- Maintain a closed herd
- Know your herd
- Know from who you are buying
  - Ask questions, be observant
- Work with your veterinarian
- Use preventative measures

Records / Information Management

Culling

- Reasons for culling
  - Production
  - Conformation
  - Health
  - Mastitis
  - Disposition

Genetic Selection

Genetic Selection and parameters for increased productivity

- Set Goals
  - Milk volume
  - Protein
  - Fat
- Resources
  - ADGA
  - USDA/DHIA

Genetic Improvement Program

Phenotype = Genotype + Environment
- Genetic improvement programs only change genotype
- Heritability is the portion of total variation due to genetics
- Rate of genetic improvement determined by:
  - generation interval
  - selection intensity
  - heritability

Factors Affecting Value of Data

- Completeness of ID and parentage reporting
- Years herd on test
- Size of herd
- Frequency of testing and component determination

Milk Production
DHIA Testing and Production Performance

130 - Cow Page DHI-203

| | Barn Name | J255 | | Index No. | 96255 |

21105454

COACH FARM

Cow
- Index No.: 96255
- Barn Name: J255
- Breed: A
- DHI ID: 21CDJ0255
- Farm ID:
- Date of Birth: 9/23/96
- PTA Milk: +497 PTA $: +62
- PTA % Fat
- PTA Fat: +16 Rel.
- PTA Prot: +16 Pctile(NM)

Sire
- DHI ID: 180851795
- Name or number:
- Breed: A
- PTA Milk: +286
- PTA % Fat
- PTA Fat: +10
- PTA Prot: +9
- PTA $: +39
- Rel.
- Pctile(NM): 0

Dam
- DHI ID: 21WPH0165
- Name or number: B176
- Breed: A
- PTA Milk: +0
- PTA % Fat
- PTA Fat: +0
- PTA Prot: +0
- PTA $: +0
- Rel.
- Pctile(NM):

Date of Test 5/7/02

Lactation Production Summary

Calving Date	Age at Calving Yr - Mo	Days Dry Before Calving	Rate	Days 3X Cond. Aff. Record	305 Day Lactation Milk	% Fat	Fat	% Prot	Prot	Complete Lactation Days in Milk	Milk	Fat	Prot	Value Product	Income Ovr Feed Cost	Type of Record
4/1/98	1 - 6	0	A	0	3063	3.4	105	3.3	101	324	3195	110	106			DHIR
4/11/99	2 - 6	51	A	0	3493	3.2	111	3.2	112	486	4905	161	161			DHIR
9/29/00	4 - 0	51	A	0	3805	3.6	136	3.1	117	365	4156	148	129			DHIR
11/23/01	5 - 2	55	C	0						166	1754	62	56			DHIR

Status Change Calved	Last Test Milk	% Fat	% Prot	Lifetime Production Milk	Fat	Protein	Milk per Day Since 24 Mos of Age	Yield Deviation Milk	Fat	Protein	Estimated Relative Producing Ability Milk	Fat	Protein
11/23/01	9.4	3.5	2.6	14010	481	452	11	+1340	+44	+43	+1041	+35	+35

Selection for Confirmation –
Linear Appraisal Scores

- Form
  - Stature
  - Strength
  - Dairyness
- Structure
  - Rump Angle
  - Rump Width
  - Rear legs, side view

- Mammary
  - Fore udder attachment
  - Rear udder height
  - Rear udder arch
  - Medial Suspensory Ligament
  - Udder depth
  - Teat Placement, Rear view
  - Teat diameter
  - Rear udder, side view

Index of Yield Evaluations

Milk-Fat-Protein Dollars (MFP$) combines evaluations into a single number

$$\textbf{MFP\$ = (0.010} \times \textbf{PTA}_M\textbf{)} +$$
$$\textbf{(1.15} \times \textbf{PTA}_F\textbf{)} + \textbf{(2.55} \times \textbf{PTA}_P\textbf{)}$$

Selection is a Continuous Decision Making Process

The greatest impact on progress is from selection of bucks

Estimated Transmitting Ability

- An estimate of a buck's potential genetic abilities based on ancestors.
- Uses available pedigree information from dam and sire for both production and type
- Have a high probability of being genetically superior

Buck Yield and Type Evaluations

Buck Yield Evaluation

Information shown is from the 0307 run.

Buck	Sire	Dam	Birth	Name
EN180779113	EN180404020	EN000596526	1989/04/14	DES RUHIGESTELLE EQUUS

Most_Daus

Herd	Daug	Inbrd	Pctile
92700198	10	0.0	97

Trait	PTA	Rel	Herds	Daus	Lac/Dau	PTA %	Mean
MFP$	+40	.83					
Milk	+243	.83	11	26	2.62		3108
Fat	+13.0					+.15	114
Protein	+8.7	.83	11	26	2.62	+.05	93

Buck Type Evaluation

Information shown is from the 0212 run.

Buck	Dau/hd	States	Herds	Daus	Appraisals
S180779113	2.00	2	7	14	31

Trait	Dau Score	PTA	Rel
Final Score	85.0	-0.0	.75
Stature	28.8	+6.6	.84
Strength	26.5	+0.8	.77
Dairyness	35.8	+1.1	.75
Teat diameter	24.4	+1.0	.80
Rear Legs	26.8	-0.5	.73
Rump Angle	32.4	+1.9	.78
Rump Width	30.1	+1.8	.77

Available Genetic Evaluations – USDA – DHIA Sire Summary

USDA-DHIA GENETIC EVALUATIONS FOR TOP 15% OF BUCKS WITH RECENT DAUGHTERS FOR JULY 2001   1

NAME	HERDS	DAUS	LACTS	REL	----PREDICTED TRANSMITTING ABILITIES-----					PCTILE
					MILK	FAT	FAT %	PROT	PROT %	
				(%)	(LB)	(LB)	(%)	(LB)	(%)	
COACH-FARMS LENOX	2	28	73	58	376	12.4	-0.05	9.4	-0.08	99
COACH-FARMS TUFF STUFF	3	86	200	62	304	12.5	0.05	9.4	0.00	99
COACH-FARMS LINCOLN	1	24	24	48	338	10.9	-0.06	9.4	-0.04	98
COACH-FARMS BUCKEYE	2	57	118	61	314	11.9	0.01	7.0	-0.10	98
COACH-FARMS BEAUXSUN	1	36	60	57	318	9.1	-0.10	8.5	-0.05	98

~~Available Genetic Evaluations –~~ USDA – DHIA Sire Summary

AI   USDA-DHIA GENETIC EVALUATIONS FOR TOP 15% OF BUCKS WITH RECENT DAUGHTERS FOR AUGUST 2014   1

REGISTRATION NUMBER	NAME	HERDS	DAUS	LACTS	REL	----PREDICTED TRANSMITTING ABILITIES-----					PCTILE
						MILK	FAT	FAT %	PROT	PROT %	
					(%)	(LB)	(LB)	(%)	(LB)	(%)	
001338415 PB	SUNSHINE ROSEMA REMEDY	2	19	34	57	246	10.4	0.05	7.1	-0.02	99
000782547 PB	COACH FARMS FLEETWOOD	2	47	150	82	264	8.0	-0.08	6.9	-0.05	98
001428122 AM	BETHEL MUR RONDA MURPHY'S LAW	2	27	56	55	361	5.8	-0.30	7.6	-0.13	98
001340326 AM	REDWOOD HILLS JAEGER	13	30	65	76	225	6.9	-0.06	6.8	-0.00	97
001449040 PB	MELLOW-MEADOWS SPIKE	2	7	9	46	182	8.3	0.06	6.3	0.03	97

Production / Type Index

- Ultimate genetic value of bucks based on daughters
- ETA with progeny testing

AIPL Web Services

http://aipl.arsusda.gov/query/public/tdb.shtml#GoatsTBL

- Queries provide display of:
  - pedigree information
  - yield records
  - herd test characteristics
  - genetic evaluations of does & bucks
  - yield
  - Type
- Access information using:
  - ID number
  - animal name
  - herd code

Web site evaluation query

Get goat pedigree and yield information
Data entry online

Enter **goat breed** and **ID number** (e.g., **A181062154** or **AI181062154**):

A181062154

Submit   aipl-250

Return to Query Selection Page

Codes for dairy goat breeds for which USDA genetic evaluations are available:

Breed	1-Letter Code	2-Letter Code
Alpine	A	AI
Oberhasli	B	OH
Experimental	E	EX
LaMancha	L	LN
Nubian	N	NU
Saanen	S	EN
Toggenburg	T	TO

http://aipl.arsusda.gov/cgi-bin/general/Qpublic/do.Q.cgi?qname=shgoat&single

Conclusion