# CASH MIRROR

Volume 9, Issue 1 November 1997

The monthly magazine devoted to cashmere goats and their fiber

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# CASHMIRROR

ISSN 1090-736X

Published each month by:

**CashMirror Publications**
2280 S. Church Rd.
Dallas, Oregon 97338

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Fax: (503) 624-1704
E-Mail: goatknol@teleport.com
Home Page: http://
www.teleport.com/~goatknol

Publisher and Advertising Mogul:
Paul Johnson
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The *CashMirror* welcomes contributions of articles and photographs. Submissions may be made by mail, fax or e-mail.

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**Cover photo by Paul Johnson**
**Krakatoa — He's big, he's bad, he's in rut...**
**Owned by Karen Huey**
**Currently residing at the Washburn farm, Salem, OR**

## The Big Neck Contest

**As featured in the July - September 1997 issues of CM**

**And the Winner is...**

## The Nielsens

**Liberty Farm, Naches, Washington**
**with their buck Gwilliam.**

**Well, he used to be their buck; Gwilliam has now moved on to another herd. All of the wonderful prizes listed will be sent to the Nielsens. Steve Hachenberger (inventor of the contest) has added one additional prize: A bag of Oreo cookies, which, Steve insists, must be fed to the buck in the traditional Hachenberger way (see cover photo CashMirror November 1996). Steve told us he wants a photograph of the Oreo Feed. This is assuming, of course, Gwilliam's new owner will let their prize buck eat oreos, and assuming that Gwilliam would even be interested in human snack food. Anyway, congratulations to the Nielsens!**

# Christmas is coming...the Does are getting fat...

# 1998 CashMirror Calendars

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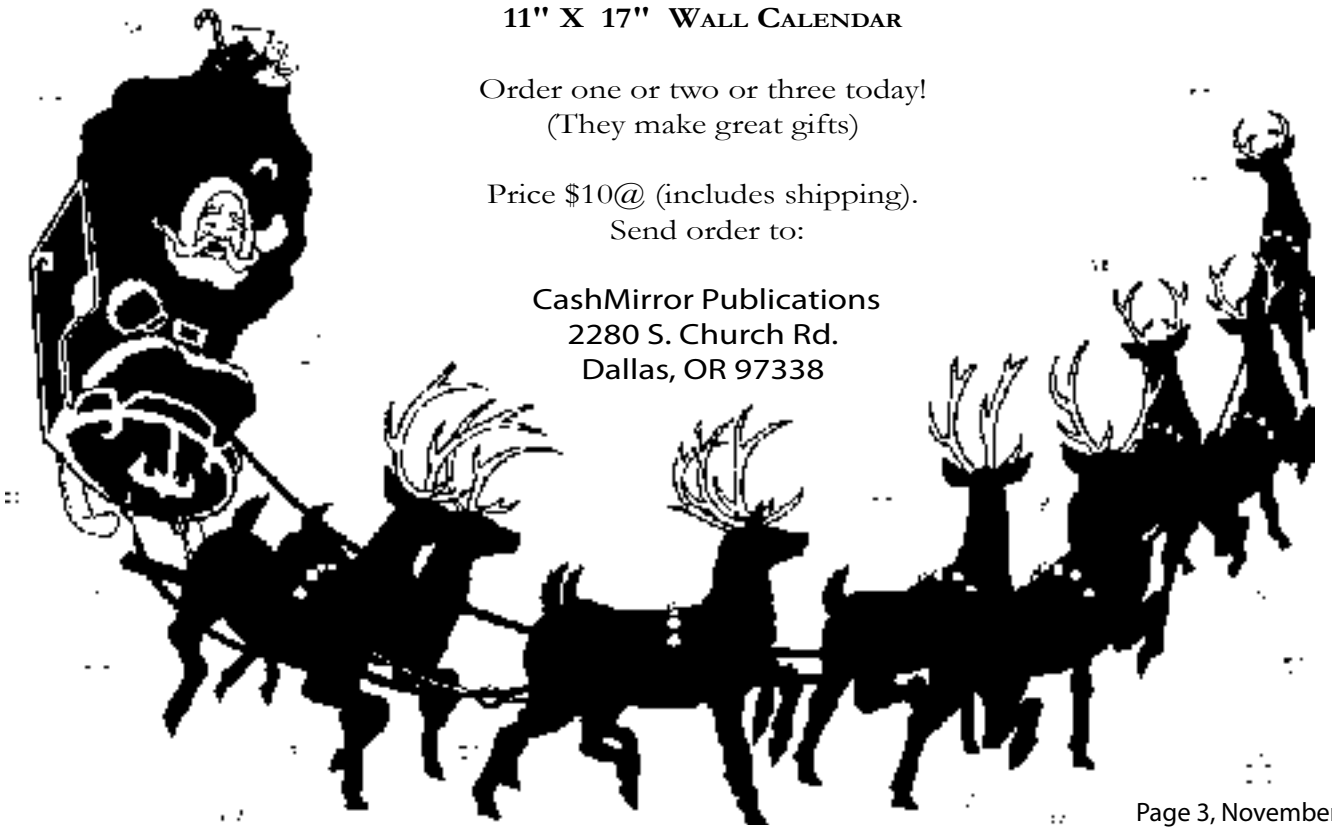

# Reflections

**by Linda Fox**

Most people buy souvenirs on their vacation. We just came back from a week in Montana with an odd collection of souvenirs—a baby food jar full of sourdough starter, an ostrich egg and a pair of clothespins with a gob of matted goat hair glued to them. Perhaps I should tell you the rest of the story.

Most of our vacations the last few years have been built around goat conferences and this one was no different. We spent three days in Bozeman, Montana at the PCMA Business of Cashmere conference with other cashmere goat enthusiasts. These three days were followed by three more days at a Pioneer Mountain Farm in Dillon, Montana learning how to correctly classify cashmere from the goats. I suppose this sort of vacation would not have pleased everyone.

The first souvenir—the clothespins with the gob of goat hair—was obtained at the Bozeman conference. Julie Becker, an artistically-inclined goat rancher from Nebraska had designed a clever cashmere goat pin using two old-fashioned clothespins—the kind that come in all one piece with no metal part. Attached to these two glued-together clothespins, was the top part of a third clothespin which served as the head. She had attached a magnet to the back, covered the whole thing with a large wad of genuine cashmere and painted on hooves, attached brown pipe cleaner horns and a set of googly eyes and tied a bell at the neck. The resulting small cashmere goat could be cleverly attached to your shirt by joining a magnet under your shirt to the magnet on the goat's rear. Julie, sensing my fascination with her clever little goat, un-magnetted the device from her shirt and insisted I wear it. So I did. After the conference, I carefully wrapped the little goat in some dirty laundry to ensure it would withstand the jostling of the return airplane ride.

When I returned home, one of the first chores was to start laundering the two suitcases full of dirty vacation clothes. Unfortunately, I though about the little goat wrapped in the laundry on the second load of clothes. Fortunately, Julie had used excellent glue. The clothespins held together and the cashmere stayed glued on, although it matted considerably. I found the little bell in the bottom of the dryer and recovered the pipe cleaner horns from the dryer vent a week later. I assume the googly eyes must have gone down the drain with the suds. I should have known that cashmere needs to be hand washed.

The second souvenir—the ostrich egg—was a gift from Steve Hachenberger, a Hamilton, Montana goat rancher who had a surplus of them. I'm not sure why he had an ostrich egg surplus, or eggs of any kind for that matter, as he raises goats, not ostriches, but he had several which he had carefully cleaned of their inside goop and buffed up for display. He was eager to pass on one of his eggs to Paul. I wasn't sure what we would do with an ostrich egg, but I supposed it would look good somewhere in the house. Unfortunately, the ostrich egg arrived safely. Paul carried it on a plane in a small brown paper bag. Several airline personnel inspected it, but no one wanted to confiscate it. Perhaps if the egg had still contained goop, we would have had better luck.

The third souvenir—the baby food jar full of sourdough starter—was obtained from Tom Dooling, the chief cook and bottle washer at Pioneer Mountain Farm. It's impossible to be fed sourdough pancakes and sourdough bread and sourdough English muffins for three days and not want to continue the event at home. At my request, he obligingly bottled some of his potion in a spare baby food jar, tucked it safely inside a zip-lock bag and I stuck it in my purse-for two days.

The first day, it traveled pretty well. We drove around the beautiful Montana country between Dillon and Butte before heading back to Bozeman. I checked the starter bottle from time to time and it seemed to be travelling fine.

The next day, I forgot all about the starter as we checked out of the hotel and headed for the airport. The plane from Bozeman travels up to about 20,000 feet and then down back to Seattle for a short stop before it heads on to Portland. In the Seattle terminal, I noticed a strange smell coming from my purse and a funny-looking liquid dripping from the bottom. The sourdough starter had escaped!

In the ladies restroom, I swabbed out my purse and rinsed the zip lock bag. Then I addressed the bottle. After being cooped up in the small jar for two days assisted by the elevation changes, things were getting explosive. The lid of the baby food jar was puffed up in the center. After some effort trying to hold the jar with those circular cloth restroom towels while trying to pull off the lid, the bomb went off. The resulting mess reminded me of the time I tried to smooth out hot split pea soup in the kitchen blender.

The airport restroom was a mess. I cleaned things up as best I could, hoping the small amount of starter left in the bottle would be enough to start a batch of sourdough delights at home.

So, instead of T-shirts or little silver spoons or other touristy delights, we are enjoying sourdough biscuits, still trying to find just the right place to display the ostrich egg and wondering how we are going to break it to Julie that we washed her little goat.

# When Readers Talk...

I recently went to the Virginia State Fair at Richmond, and found there a copy of *Cashmirror*. I was fascinated to find that so much cashmere breeding stock comes from Australia, and to read the article on the marketing of cashmere from Australia. I met a number of charming goats (and people, too), among them many with Australian names.

When I was growing up in Australia during the faraway days of the Second World War, my family lived in a very small town at the edge of a large series of salt lakes. The lakes were about 5 miles wide, and 80 miles long, and were bordered on the outside by a narrow sand barrier with the Southern Ocean on the other side. On stormy winter nights we could hear the surf pounding on the beach across the lake, and could imagine the wild scene on the Ninety-mile Beach. Desolate, unreachable by road, and to my 8-year-old eyes, the most beautiful place in the world.

There was a small farm on the barrier, run by a very reclusive gentleman who kept some livestock, including goats. Since there was no road out to the beach, he had to transport everything by boat and one of my memories of the place is of seeing him setting out early in the morning with two or three cashmere goats balanced on their skinny legs, bleating and calling piteously, as they were shipped in his open outboard motorboat to their isolated and windy new home. What happened to the goats? What did they live on out there? Can they live on salt grass? Were they some of the ancestors of the feral cashmere goats to be found now?

I enjoyed the magazine, although I have no practical use for it, since life in Arlington, VA is not conducive to the keeping of livestock except for Jenny, our Siamese cat. She says the pictures of your cat are pretty funny, but they'd be better if they were of a civilized cat like a Siamese. Thanks for listening, and for a good read. I also liked the Shahtoosh article.

Patricia Bragdon
Arlingon,Virginia
November 2, 1997

— — — — — — — — — — — — — — — — — — —

Hi,

Here's some photos we hope you can use, and with people this time!

Virginia and Kevin

And: a note to Mickey, from the cats of Black Fen Farm:

So look here, you think you have it so bad. Not only do our people waste an outrageous amount of time on those rotten goats, we have to share our house with two Border Collies. With all of us and only two laps we even have to "double-up" at times, and that always leads to a scuffle.

In addition to all this, those goats have encouraged the attendance at fibre shows. We got let alone all last weekend, and had to take revenge on a undefended spinning wheel! SO STOP WHINING!

The resident felines of Black Fen Farm:

| | |
|---|---|
| Dennis the Menace | Bearcat |
| Swamprat | Phu |
| Snickersnack | Harrycat |
| Poison Ivy | |

October 25, 1997

*Dear Dennis, et. al.:*

*Hang in there little buddies! We can beat this goat thing! Use your brains... well, how about your claws and teeth?! As the immortal philosopher Bill the Cat said when confronted with insurmountable difficulties, "Pfffffffftht!"*

*Mickey*

**Readers Talking Back...continued**

### Update on "Leaving on a Jet Plane"

Dear Paul and Linda:

Mike and the goats arrived safely in Grand Rapids late on Monday night. By the time I got home on Friday, everyone seemed fairly well adjusted.

Unfortunately, we did not know that Jolly's name was "Jolly," so he was christened "Dallas," in honor of his home town. He seems okay with it.

We received your magazines in the mail and really appreciate them. Apparently Mike left his two copies of CashMirror on the airplane. I think he was anxious to get to the baggage claim and check on Stardust and Dallas.

By the time he did get there he had to ward off all the city folk who had initially mistaken the goats for dogs and felt they had to stick their fingers in the carrier, just to be double-sure.

After I left Portland on Monday I flew on to Montana and then North and South Dakota. I told everyone I met about Stardust and Dallas flying home with Mike in a SkyCarrier. Most people thought it was a cute story, but those farmers in South Dakota broke out into deep belly laughs when I told them we bought a doe and wether. Apparently they think a buck would have been more appropriate for a beginning goat herd, regardless of their unusual grooming habits. After reading the article in your latest CashMirror about artificial insemination, Mike agrees. We'll have to send the SkyCarrier back to the PDX to pick up a buck. I think one farmer felt so sorry for me that he gave me some of his mohair from a 400 head Angora goat herd. But I felt sorry for him too. He had 400 head of angora that he recently sold after keeping them for three years. All their fleece is in the barn, unsold.

Well, after Mike finished the pen in the barn he said, "Lots more goats can fit in here!" I don't think you've heard the last of the Lockwoods—or Stardust and Dallas. Maybe we can do a story for the CashMirror written from Stardust's point of view. None of those pygoras that beat up on her at the fair have ever ridden in an airplane, I'll bet. And just think of the honor of breeding a whole new herd—the first one in the state!

We took some pictures of them too. Sorry it's taking so long, but we'll get it to you soon. We enjoyed meeting you and hope to keep in touch.

Mike and Susan Lockwood

# 1977 Oregon Flock & Fiber Festival

## DECLARED A HUGE SUCCESS!!!

On September 27th and 28th, a new annual celebration of natural fiber was born. In two beautiful late summer days over a year and a half of planning paid off in a show that brought animals, fiber demonstrations, vendors and over 3,000 visitors together.

The Clackamas County Fairgrounds provided a sun-dappled venue to show many urban visitors what the explosion of interest in natural fibers is all about.

There were over 500 animals and 100 farms represented. There was every kind of fiber bearing animal, from Angora rabbits to Yaks. Visitors could stroll through the barn and see Alpacas and Angora goats or stop and watch one of the Classic Breed sheep shows. In the show rings and throughout the barn, the theme was providing education and information to the visiting public.

There were opportunities for knowledgeable shepherds to answer questions about their animals and their care. Kids could pet fuzzy goats and everyone could marvel at the four-horned Navajo-Churro ram.

A trip over to the main pavilion might take you past any of a number of demonstrations designed to provide information about the fiber industry. Sheep shearing, flax spinning, rope making, handspinning and many other learning experiences were designed to give a complete picture of how fiber is harvested and prepared for use in a wide variety of finished products.

Upon entering the main pavilion, you could wander among more than 75 vendors who enjoyed a very successful weekend marketing finished fiber products, equipment and supplies.

Upstairs you could tour through the Homespun Gallery and the Fiber Art Show. These judged contests provide an understanding of what it takes to be the "Best of Show." If one of the more than 200 entries inspired you to try your hand at creating your own masterpiece, you could take a look at the huge variety of judged fleeces, taking the opportunity to find out what a grand champion fleece looks and feels like. You might end up like scores of others, buying that special fleece to start your own project.

The comment cards from visitors, vendors and exhibitors left little doubt that the Festival was a huge success. It not only provided an opportunity to show animals and fiber in front of nationally recognized judges, but it was also a chance for many visitors to be exposed to a whole new experience.

The experience can be renewed at next year's OFFF to be

**Continued on next page**

## OFFF

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to be exposed to a whole new experience.

The experience can be renewed at next year's OFFF to be held on September 26th and 27th, 1998, at the Clackamas County Fairgrounds. If you would like any additional information, write to: Oregon Flock & Fiber Festival, 30881 SW Bald Peak Rd, Hillsboro CR 97123 or e-mail: wstlstop@gte.net.

**razberri kyan (aka Pat Almond) was all smiles about her Best of Show cashmere fleece. This fleece was judged the best overall raw fleece of the 256 raw fleeces entered. The 256 fleeces entered included 128 sheep, 99 fiber goats (28 Angora, 31 cashmere and 50 Pygora), 10 Camelids, 3 dogs, 1 yak, 1 musk ox, 1 silk, 1 flax and the fuzz off a partridge in a pear tree.**

### Cashmere Fleece Competition

(31 entries)
Judge: Melda Montgomery

**Shorn Division**
Sharra, Diana Hachenberger, Castle Crags Ranch, Hamilton, MT
**Combed Division**
Lady Margaret, Pat Almond, Aboriginal Fibre, Mulino OR
**Grand Champion**
Lady Margaret, Pat Almond, Aboriginal Fibre
**Reserve Grand Champion**
Sharra, Diana Hachenberger, Castle Crags Ranch

### 1997 Oregon Flock & Fiber Show Results

### Diamond Award Winners

**Supreme Champion Ewe**
Romeny, Black Rock Ranch, Redmond, OR
**Supreme Champion Ram**
Shetland, Yaquina View Farm, Newport, OR
**Supreme Champion Doe**
Hollyhock Hollow Margo (Pygora), Goose Creek Farms, Eagle Creek, OR
**Supreme Champion Buck**
Colored Angora, Cornerstone Kidoebuck, Yoncalla, OR
**Best of Show—Homespun Gallery** (70 entries)
Navajo rug, Kathleen Quick
**Best of Show—Skein** (99 entries)
White pygora fingering-weight yarn, spun worsted, Sally McCarrick, Rainer, OR
**Best of Show—Raw Fiber** (256 entries)
Lady Margaret (cashmere doe), Pat Almond, Aboriginal Fibre, Mulino, OR
**Judge's Award—Juried Fiber Arts**
Woven wool tapestry and carved Honduras mahogany, "From Afar," Monica Setziol-Phillips

### Division IV Cashmere Goat Show

**Wethers**
Meakins
**Bucks, Less Than 12 Months**
Silver Buck, Debbie Setere, Sherwood, OR
**Does, Yearling Less Than 24 Months**
HKL Bonnie, Cynthia and Karl Heeren, Hokulani Farms, Bend, OR
**Does, Kids Less Than 12 Months**
Mattie, Debbie Setere, Sherwood, OR
**Grand Champion Doe**
HKL Bonnie, Cynthia and Karl Heeren, Hokulani Farms, Bend, OR
**Reserve Grand Champion Doe**
HKL Tiffany, Cynthia and Karl Heeren, Hokulani Farms, Bend, OR
**Best Herd**
HKL Bonnie, HKL Tiffany, HKL Bandit, HKL Cleo, Cynthia and Karl Heeren, Hokulani Farms, Bend, OR
**Best Fleece**
HKL Bonnie, Cynthia and Karl Heeren, Hokulani Farms, Bend, OR

Judges: Cashmere Goat Show—Susan Stutz, Overall Goat Show—team judged by Lisa Zietz and Donna Zimmerman, Raw Fiber—Melda Montgomery, Homespun Gallery—Thelma Pederson, Juried Fiber Arts—Vince Zettler

# Oregon Flock & Fiber Festival (Cool!)

**Goat Knoll kids travel to the festival in the back of the Bronco: Worf, NightHawk, NightShade and Stormy Wether.**

**Cynthia Heeren with her award-winning doe HKL Bonnie at Hokulani Farms in Bend Oregon. Bonnie won Grand Champion Doe and Best Cashmere Fleece in the cashmere goat show.**

**The Diamond Award winner for Supreme Champion Doe, Hollyhock Hollow Margo (center), Diana Rodes (owner, right) and Jill Gallagher (breeder).**


**Paul mans the *CashMirror* booth (briefly).**

**Liner (Pygora breeder, left) and Fox (cashmere breeder) settle their differences at the *CashMirror* booth.**

**Debbie Setere's impressive buck "Silver Buck"—Winner of the Cashmere Goat Show for bucks less than 12 months old.**

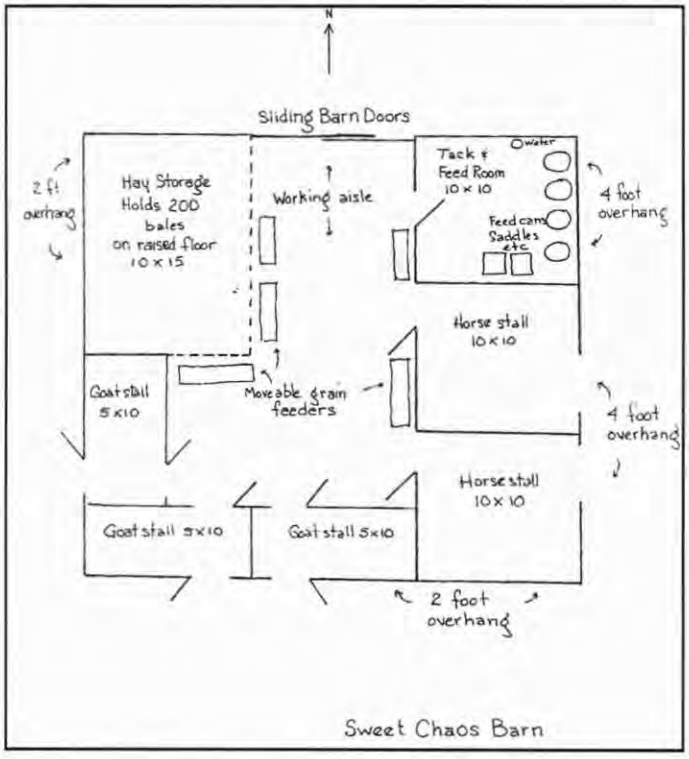
# Raising Cashmere Goats the Forbes Way

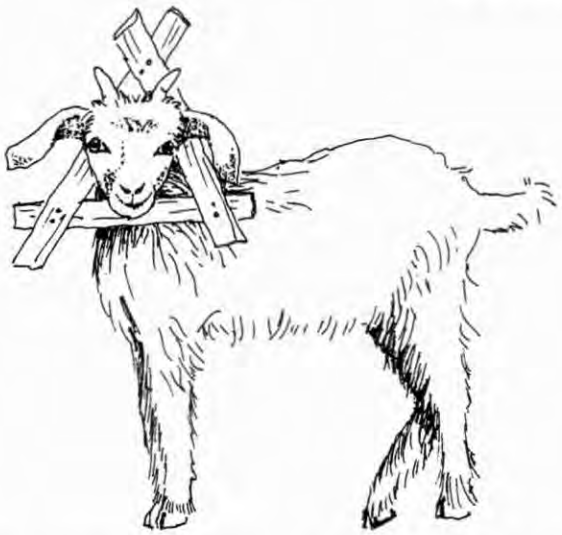
**By Pam Forbes**
**Sweet Chaos Farm**
19843 Foggy Bottom Road, Bluemont, Virginia 20135

*Pam and Jim Forbes and their young children moved from a University town to the country in 1976. The entire family participated in all aspects of country living. They had huge gardens, an egg business, horses and foals, geese and Nubian dairy goats. The kids (human) were raised on goat milk and the family "fooled around" with making cheese, yogurt and cottage cheese.*

*The Forbes family lived on three different farms before purchasing their current ten acres in 1981. Here, they built everything from scratch—using experience gained from trying to make old dairy barns or small horse stables and chicken houses fill their goat and sheep needs. Working around old barbed wire cow fences and falling-down rail fences gave them a great deal of knowledge about what works for goats and what definitely does not!*

*Pam says that the children are now grown and flown the nest, and ironically, they now have even more animals with just Jim and her taking care of them. They were given a small flock of cashmere goats just when they were down to their last two Nubian does and small flock of sheep for market lambs and spinning fleeces. Now they have "jumped in" and their two flocks are eighteen animals each. The horses have gone. They once had five. Their 31 year old mare went to heaven this year and now they just have Mimi, a black pony,*



*who seems to also be a good dog deterrent in the pastures.*

*The Forbes have come a long way since 1995, in gathering cashmere information and now would like to participate in the dialogue and share what they have learned:*

My daughter and I designed our barn since we were putting it and the fencing up from scratch on 10 acres of poison ivy and blackberry brambles. We knew from experience that, 1) goats must have access to shelter at all times, and 2) that we wanted to work and feed from inside the barn. So the barn is designed for all feeding of grain, shearing, foot trimming and medicating to be done inside and every pasture leads to a stall. Flow into pastures is directed by the swing of a gate. All stalls have interior doors as well as exterior. The barn is 30' X 30'. The tack and feed room is 10' X 10', two horse stalls, now used primarily as goat and sheep stalls, are 10' X 10'. Three goat stalls are 5' X 10'. There is a hay storage area, 10' X 15', and a good aisle for working and setting up the grain feeders. We divide the smaller stalls at kidding and lambing time with home-made pieces of fencing. During a blizzard we can close the gang in a large stall, with enough small stalls to separate out the ones on the bottom of the pecking order.

All pastures have at least two gates. A few are 4' wide, most are 8' or larger so the tractor can move from one pasture to another and we can move flocks either through gates or through the barn and out a different exit. This gives us a tremendous amount of control so we can rotate easily and frequently. We rotate every two weeks if possible. With our pasture set-up, we can keep at least one vacant pasture between the ewes and does and the buck and the ram.

My husband, Jim, is the "expert" on construction and I have to give him credit for being able to build

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**Sweet Chaos**
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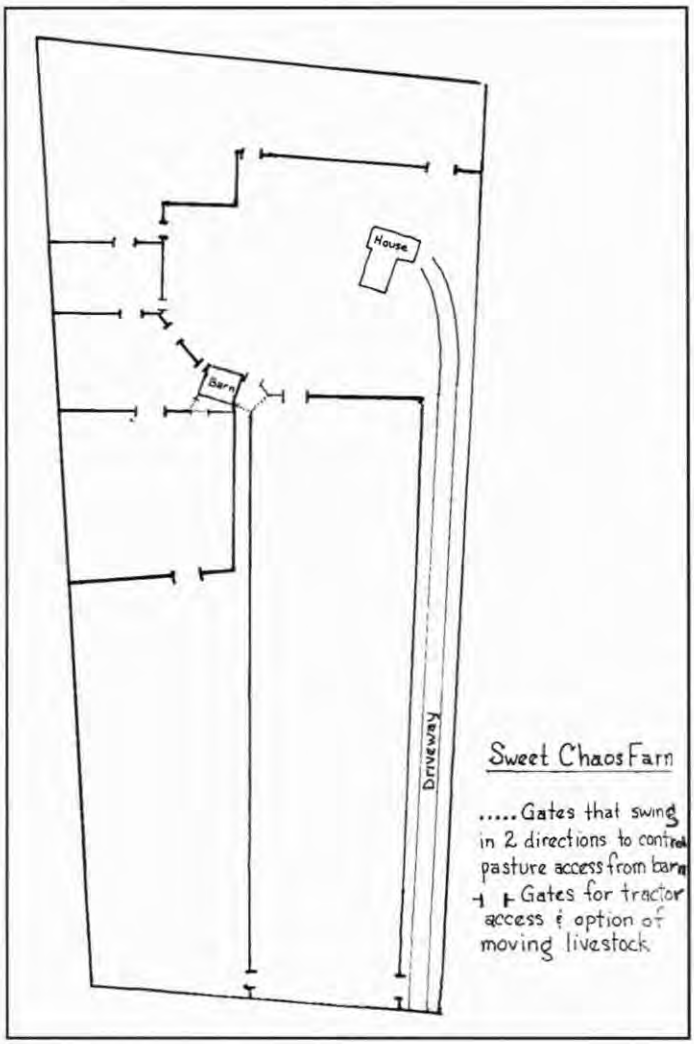
the barn, hang all the stall doors, and come up with the idea for all the gates. We call him the "soil boss," for it is he who maintains the pastures. The tractor, chain harrow, spreader, and mower have done miraculous things for the pastures' health. The loss is that there are fewer weeds and vines or "interesting goat stuff" to eat—just nice grass and clover. But we do have one wooded pasture which is a big treat for all, including the local deer. A few times a week, we take the goat flock out through the gate at the end of the pasture along the tree-lined driveway and let them work on the underbrush while we stand by with shepherd's crooks and let them feast on Bittersweet, Virginia Creeper, poison ivy, and the low branches of Black Locust, Paulownia, and White Pine. Their favorite of all—day lily and Siberian Iris foliage. Of course!

Goats have E.S.P.—we are convinced they read your mind and choose the one and only plant or tree seedling that you don't want them to go to. Evenings on the drive are serene. I am the flock queen, and when I call my 18 lovelies and walk back toward the gate to return, they all come.




Our fencing is an interesting variety of what we could afford, when we could do it, and what was expedient. I'm sure everyone understands! Most of the fencing is American wire, which has stay wires 12 inches apart. The best is sheep fencing with stays 6 inches apart. The wooded pasture has been electric for years and we are slowly replacing it. Electric requires the most upkeep. We are slowly replacing the lines of American wire which started deteriorating badly after 15 years of goats and ponies using it to scratch their sides and rumps, with sections of four board fence. All these fences work fine, and we don't have a dog problem. However, this year we have had two adorable orphan babies that we bottled—Luna and Cisco—and of course for the first few weeks it was so much fun to have them up on the deck. That promised to grow old very quickly and we knew they had to assimilate into the flock. But since they thought they were puppies, they slipped out between the boards or through the 12 inch squares of wire, continuously, to come and BE with us! Bummer lambs and bottled Nubian babies never seemed to need to leave the flock like this to join the "people world." I tried all kinds of makeshift things to try to keep them in. We have several 8 foot sections of prefabricated picket fence that we use for tons of things, but I would have needed hundreds of them to block the babies in—may as well re-fence the whole place. Tying baling twine across the 12 inch squares was hopeless too, but I tried. Finally I created what I call the "goat yoke" (see illustrations at beginning and end of this article). It is the second version and so far is 100% successful. It will have to stay on until they are just too big to get out anymore, and they have adjusted very well. I watch their necks to be sure no sores or raw places develop. The yoke slides up and down and does not interfere with eating or drinking.

Once our flock got too large for individual feeding pans and my milking days were over, we built grain feeders that can accommodate 5 to 10 animals at once (see illustration next page). We built several from materials on hand, mainly 2 X 4's and 1/2" plywood. They vary in size, from 4' to 6' long. They are kept in the aisle in the barn. I put the grain in first, and then let in the first group.

When they have eaten, I shoo them back out their door, refill, and let in the next group. This way, I see each animal every day, make sure they are eating, get their share, and see if anyone is limping or hanging back. I can catch up any that need attention. With all the critters coming into the barn regularly, there

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**Sweet Chaos**
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are no wild "round-ups" when the vet or shearer is coming. When it is vaccination time, or foot trimming day, I just get them in for feeding, then herd them into a closed stall and take out the ones needing tending, tie them to a post and *voila!* Easy!

The babies do tend to jump into the feeders, so we have fiddled with modifications to keep them out. We do not do creep feeders. Babies learn to eat with their mothers and when separated for weaning get plenty of grain without competition.

We have tried many variations on hay feeders. The best was the keyhole type for our Nubians, who are hornless. However, this is no good for the Cashmeres with their horns, and no good for sheep who do not eat up over their heads or climb to eat. I copied designs for octagonal feeders on legs from the Wool Show. That was O.K., but lots of wrestling and shoving resulted in someone always being pushed out. I sometimes use a bunch of wooden apple crates and various metal or plastic tubs, but primarily I feed the hay on the ground. I make at least 20 small piles in a huge semi-circle in the pasture for each flock. This way, the bossy ones cannot control all the piles. No seeds or stems get in necks or fleeces and hay seeds go into the ground. There is some waste, but it's not bad and it can be collected for bedding. With a good worming program, parasites are not a problem either. This is the simplest solution for me and has been successful for 21 years. With collars on all the goats and all the livestock accustomed to coming into the barn for grain, handling them is no problem.

When it is time to comb the Cashmeres, I do about 3 goats each day. Sometimes I will do 3 in the morning and 3 in the evening. I keep large charts taped inside my kitchen cabinet doors; one for sheep and one for goats. I note every combing, foot trim, and worming, etc., each month for each animal. I highlight the wormings so I can see quickly when it is time. I keep a large collar in the barn for the sheep, and there is a lead line tied to a post. I use the crook to catch up a ewe, collar her, tie her to the post, and take care of feet and shots. They are all used to this and there are no big struggles. I do it all standing; I can't throw the sheep like I used to—and it was stressful for them and exhausting for me. I wouldn't consider shearing my sheep. Talk about exhaustion! And, oh my aching back. I also don't want second-cuts, so I leave it to the shearer.

However, after the Cashmere has been harvested and it is time for a "summer trim," shearing the goats is very easy. They are used to being handled and combed, so I tie them to the post, use an Oster Groom Master and whiz away. I found that starting to comb in January is a waste of time, and the goats seem to

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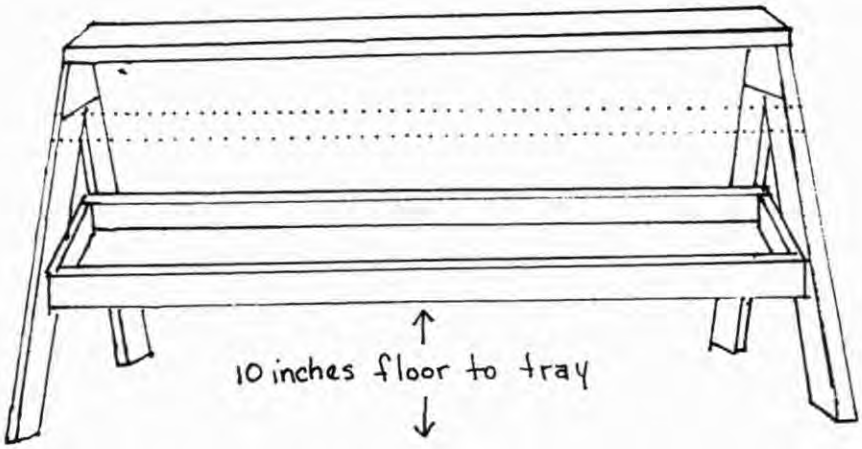
Moveable Grain Feeder - Sheep and Goats




..... Bar added to keep babies from jumping in grain. 10" above top of grain tray. Enough room for horns and enough room for persistant babies, but it helps some.

**Sweet Chaos**
**Continued from previous page**

wince, as though it is pulling too much. Here, the undercoat lets go in March. By mid-to-end of April, I am all finished.

I keep a paper grocery bag for each animal with their name on it and put in the cashmere as I comb it. I have tried a large variety of combs and brushes and de-matters. The best seems to be a very nice quality dog comb with a double row of teeth that alternate. It is heavy duty and works well. If a goat has some vegetable (or other) matter in her coat, I do a light surface brushing with a wire-tooth dog brush first.

So far the sheep are the producers. We sell lambs to clientele built up over the years. We pick up the best skins after slaughter, de-fat and salt them down, and send them to the tanner. We sell 6 to 8 finished skins for $65 to $90 each. It's a lot of work and not a big profit, so I'm considering raising the price. A friend takes some on the road to fairs, and my daughter and some of her New Hampshire friends buy some too. A professional weaver (friend) sends some of her students to me for fleeces. I save the best ones for myself, after picking them over pretty ruthlessly and washing them for storage. White wool not sold and poorer quality colored wool gets sent to the wool pool. The price paid per pound is low—almost an insult, but better than letting it sit around just taking up space.

I am listening and learning while I wait to see what direction I will go with the Cashmere. Should I develop a hand spinner clientele or sell the fiber through Cashmere America? I am interested in being supportive to this new industry, but I must be practical as well. Whatever direction I may choose, I know that goats are in my life to stay.

*Drawings and diagrams for this story by Pam Forbes*

# Goat People
## Laura Foran

*By Ellen Lovell*
*Coos Bay, Oregon*

Our granddaughter Laura is spending the year with us in order to attend college in this area.

She had a week to get acquainted with goats, dogs, cats, chickens and fish before we took a 3 week vacation leaving her in charge. She only had a few minor problems, a dog with a sore foot and one goat who got her head firmly stuck in the fence, which required a call for help from the neighbor.

She even got along with the goat we affectionately call the "bitch"!

Pretty good for a city gal!

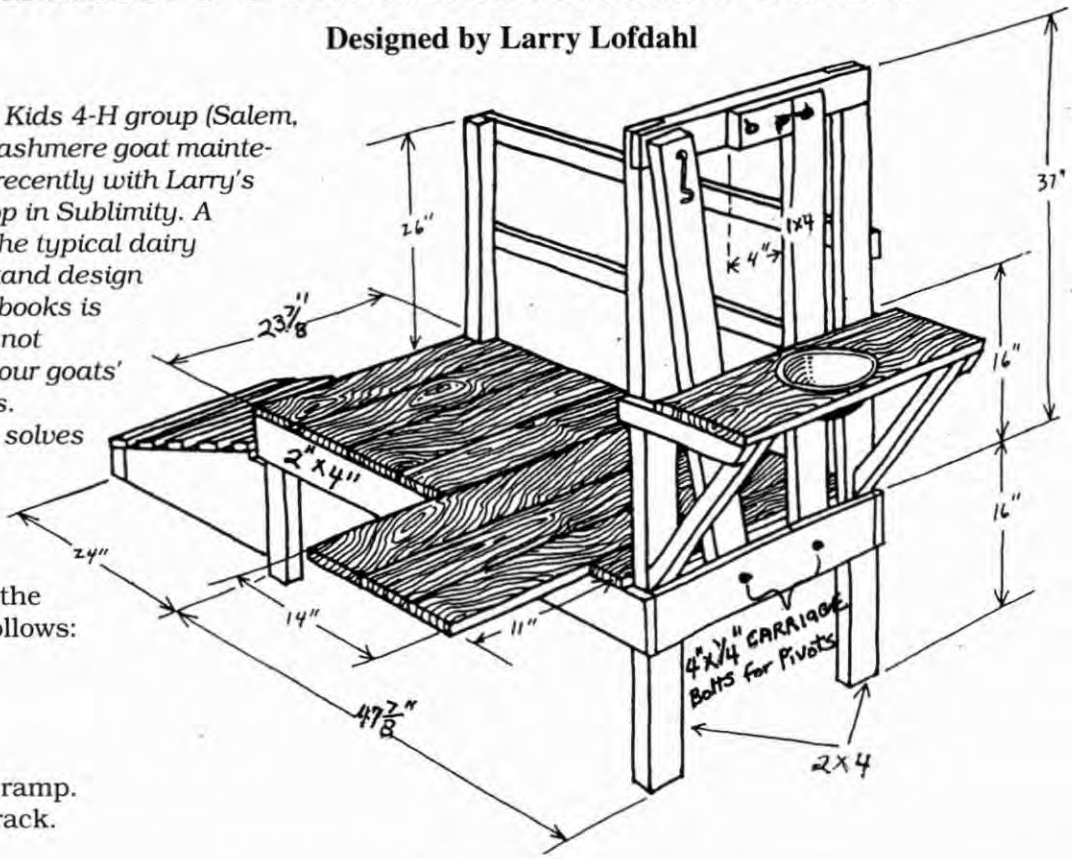
**Laura getting acquainted with her charges**

# Goat a d g d e t s

# Cashmere Goat Maintenance Stand

**Designed by Larry Lofdahl**

*The Cashmere Kids 4-H group (Salem, Oregon) built cashmere goat maintenance stands recently with Larry's help at his shop in Sublimity. A problem with the typical dairy goat milking stand design found in most books is that it they do not accommodate our goats' beautiful horns. Larry's design solves the problem!*




Modifications made to the design at right are as follows:

Eliminated:

1. The 14" X 11" seat.
2. The 22" X 24" back ramp.
3. The 26" X 47" side rack.

Added:

1. Expanded the deck size to 23-7/8" X 47-7/8" to accommodate plywood top.
2. Added two 4" X 1/4" carriage bolts to bottom and an extra eye and hook to the top of the head holder, so as to gain extra opening width for our horned goats.
3. Add 2" X 2" X 12" braces (4 total) from the sides of the legs, up to the under sides of the 2 X 4 deck rails.

Note: Most all joints were assembled with screws.

**Cashmere Kids try out their goat maintenance stands. They built them at LarryLofdahl's shop. They work! Photo by Candy Washburn, Group Leader.**

# Interpreting a Feed Tag

**by**

**Frank Pinkerton, Ph.D.**

Goat owners typically purchase sack feeds, protein concentrates, vitamin and/or mineral supplements, and individual feed ingredients. Some may also have their own feeds custom processed/mixed. In any case, they need to be able to read and interpret feed tags.

The tags found on commercial feeds are a legal requirement of State Regulatory Agencies. State regulators belong to the American Association of Feed Control Officials (AAFCO). This organization provides guidance to Feed Control Service Administrators concerning identification of feedstuffs, feed mixtures, minerals, vitamins, and feed additives including antibiotics. AAFCO does not tell feed manufacturers what they can or cannot put into mixed feeds nor does it police the products offered to buyers. Only Regulatory Service personnel can monitor and test feeds in their laboratory and thereafter notify manufacturers if their analyses does not match the feed tag guarantees. In certain circumstances a feed company can be brought to task by Regulators and penalties imposed. If a producer feels his purchased feed is not as shown on the tag, the producer may request the state Regulatory Agency to run a check.

AAFCO approved tags typically carry the brand name, its company address and numerically coded batch number as well as descriptive name (e.g., kid starter or grower or milking ration) and form designation (meal, pellet, coarse ground, etc.). If the feed contains any medication, the tag must identify the drugs and the concentration either in grams of additive per ton or in mg. per lb. Also, the medicated tag must carry a warning denoting withdrawal time in days prior to sale of animals or product therefrom if warranted. Most, but not all, tags also provide directions (how, when or quantity to feed per head per day).

The guaranteed analysis section of the tag typically reads: *Crude protein* not less than X%. A statement such as, "this includes not more than X% equivalent protein from non-protein nitrogen", must be added if all the protein is not from "natural" ingredients, i.e., urea.

*Crude fat* not less than X%. Note: The minimum fat required in daily rations for goats is not precisely known, but ranges of 1 to 5% seem adequate. Typical concentrate formulations shown on feed tag range from 1 to 3%; forages usually contain somewhat lesser amounts of fat.

*Crude fiber* not more than X%. The higher this figure, the lower the digestibility energy of the feed; the price should reflect this lesser energy, but frequently does not. Some manufactures also show minimum/maximum quantities of calcium and phosphorus and other macro and micro minerals. Units of vitamins A and D may also be shown; such figures are not required by AAFCO.

The *ingredients* listing on the tag does not identify individual feedstuffs. Instead, it uses *categories* of feedstuffs, e.g., *grains products* (such as corn, oats, barley, wheat), *processed grain by-products* (bran, brewers grain, hominy), *plant protein products* (soybean meal, cottonseed meal, etc.), *molasses products* (cane or beet molasses, dehydrated molasses, wood molasses), and *forage products* (alfalfa meal or leaf meal). The phrase, *roughage products*, identifies the presence of cottonseed hulls or other types of hulls or ground hays. This total must be shown as a percentage of the feed. Their presence will cause the crude fiber guarantee to be abnormally high (16-26% or more) and, as indicated above, lowers the digestible energy content.

The tag will also list sources of minerals, any preservatives used, and any vitamin supplements present or used.

# Objective methods for characterizing cashmere

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This paper is a Proceedings paper for the Business of Cashmere Conference III held in Bozeman, Montana, October 24-26, 1997.

Author's note: Much of this material was first assembled for the 4th Annual National Conference of Cashmere Producers of America held in Columbia, MO Dec. 6-8, 1991. The information has been updated where appropriate.

ABSTRACT

Important physical characteristics of cashmere are identified and include average fiber diameter and variability; scoured yield; mechanical yield; fiber length and variability; color; style and character. Objective and subjective methods for quantifying these physical properties are reviewed and explained.

## Introduction

Cashmere is the fine, down undercoat produced by cashmere goats. The fiber was first seen by Europeans in the 18th century in Kashmir, hence the name. However, Chinese historians claim that original production of the fiber was in Tibet by Zang goats over 4,000 years ago (Ou et al., 1996). The fleece of the cashmere goat is made up of two distinct fiber types, the fine undercoat known as cashmere down and the coarse outer hair often referred to as guard hair.

Cashmere goats are a type of domestic goat native to the mountainous and high plateau regions of Central Asia. Cashmere is not a distinct breed; China alone harvests cashmere from at least 12 distinct breeds of goat. In a broad sense, the term cashmere goat refers to any goat from which "commercial quantities" of cashmere can be harvested. Most commercial cashmere goats are white, with tan, gray and mixed colors also being common. Generally, Chinese cashmere goats are small to medium in size, bucks probably averaging < 50 kg and does about 30 kg. Commercial cashmere production in China ranges from 80-350 g/goat with a national average of about 125 g/goat. However, selected flocks producing 500 g/goat annually exist and the Chinese record is 975 g of cashmere down from a single doe (Ryder, 1987). Teh and Gipson (1992) presented detailed production and quality data for 12 breeds of Chinese cashmere bearing goats. The longer, finer, white cashmere is of greatest value to the textile industry, a fact that is influencing selection criteria for animals in countries developing cashmere flocks. Of all the Chinese breeds that have been improved for cashmere, the Liaoning has probably received the most attention. The breeding objective for Liaoning cashmere goats was set in the 1980's as follows: diameter of down, < 16μm; down production of breeding does, > 530g; down production of bucks, > 1,000g; down yield (combed) > 70%; and down fiber length, 5.5 cm. According to Ma et al. (1996), this objective was met in 1994 and the Liaoning has become an important breed in China. Live weights for mature Liaoning bucks and does are now up to 52 and 45 kg, respectively.

Cashmere down begins to grow after the longest day. On most goats, it continues to grow (in the northern hemisphere) until late December or early January. Some goats have been observed to grow cashmere for longer periods and even year-round, suggesting an obvious course for future selection. In China and Outer Mongolia, cashmere is traditionally removed from the goat using special combs at the onset of shedding. Multiple combings are required to remove all the down using this labor-intensive method. Since guard hair is (usually) longer than cashmere, its staple length is frequently reduced by clipping prior to removal of the cashmere by combing. In Iran, New Zealand, Australia, and the U.S., cashmere fleeces are usually removed by shearing. Shearing results in a product containing more guard hair than that resulting from the combing process.

After removal of cashmere from the animal, the fleeces are sorted, to varying degrees, prior to marketing. This has always been a labor-intensive part of the operation and remains so today. Typically, cashmere is sorted first by color, then hair content and finally, fineness of the cashmere component. As Table 1 shows, there is a relatively broad range of values for each of these three characteristics. This results in a broad spectrum of cashmere types available from different places around the world.

Raw cashmere is scoured and dehaired prior to processing into yarn. The mechanical details of commercial dehairing are closely guarded industrial secrets. Generally, the process includes a modified carding operation in which guard hair and cashmere are efficiently separated.

## Characteristics of cashmere

Physical characteristics of cashmere are summarized in Table 1. Microscopically, cashmere down fibers have a similar appearance to merino wool of comparable dimensions. The epidermal scales are more distinct in cashmere than in mohair but less than in wool. Five to seven scale margins per 100 mm are apparent covering the cortex which is invariably free of medullation. Distribution of pigment is uniform in pale colored fibers whereas in dark fibers pigmentation tends to be unsymmetrical in the fiber cross section indicating the presence of mesa, ortho, and para cortical cells. The fiber cross sections have a high degree of circularity. Fibers that have been combed (versus sheared) contain roots. Most fibers also contain a tip. In contrast, the guard hairs consist of three distinct parts; the epidermis, cortical layer, and medulla. The continuous medulla constitutes a large portion of the outercoat fibers and this feature combined with the relatively large size permit easy differentiation

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between guard hair and cashmere. The cross sections of guard hairs vary from nearly circular to elliptical or kemp-like. In fact, microscopical counts of guard hair to cashmere fiber ratios have been used to determine secondary to primary follicle ratios since guard hair is produced only in the primary follicles and cashmere in the secondaries (Henderson and Sabine, 1991).

The cortex of most wool contains ortho and para cortical cells arranged in a bilateral manner. This factor is responsible for the characteristic crimp of wool. In contrast, the cortex of mohair is composed almost entirely of ortho cells. Hence the low levels of crimp normally found in mohair. Para cells have been observed in mohair in which case they appeared in a radial type of cortical asymmetry. A similar arrangement is observed in luster wools. Cashmere, on the other hand, is composed of three types of cortical cells, ortho, mesa, and para, arranged randomly in the cross section. However, cashmere fibers exhibiting bilateral arrangement of cells (Corrigan, 1988) and a ring of para cells surrounding ortho cortex (Teh, 1989) have also been reported.

In the traditional growing areas, the finest cashmere is produced in China and Outer Mongolia, normally averaging in the range 14.0 to 16.5µm. Cashmere from Iran and Afghanistan tends to be coarser and in the range 16.5 to 19.5µm. Commercial quantities of Indian cashmere (pashmina) are available in the 12 - 16.5µm range. Compared to wool, the range of individual fiber diameters within a sample is narrow. In the raw state, cashmere contains 10 - 35% impurities. Grease and suint typically compose less than 5% of this amount, the bulk of the impurity being dead skin, sand, and dirt. Heavy contamination of cashmere fleeces with vegetable material is rare.

Cashmere from different sources varies in length from 12 - 90mm. Generally, fibers longer than 35 mm (and finer than 16.5µm) are used to make knitting yarns. Cashmere shorter than 35 mm is used predominantly by the weaving trade. Compared to other animal fibers, cashmere is relatively weak having about 10% less strength than wool and 40% less than kid mohair. However, lack of strength does not appear to affect wearability, since textiles composed of cashmere will often outwear similar structures made of wool. The strength and fineness of cashmere can result in pilling problems, particularly in improperly constructed fabrics.

Chemically, cashmere fibers are indistinguishable from wool and mohair. However, the fats and lipids found on raw cashmere (and cashgora) are different than those produced by Angora goats and sheep. Because of the relative fineness of cashmere, it is more sensitive to chemical treatment and dyeing than wool or even mohair. Over a long period of time, white cashmere has commanded higher prices than the colored product. This has led to the development of bleaching processes for producing white cashmere from the less valuable colored product. As with the dehairing process, specifics of the iron-catalyzed hydrogen peroxide bleach formulations are trade secrets. Amicale Industries uses such a process that was developed by USDA, ARS researchers in Philadelphia.

Objective Measurements

An objective measurement is an assessment made without distortion by personal feelings or prejudice. It is the opposite of subjective assessment which is an evaluation made by human judgment using the senses of sight and touch. By necessity, therefore, an objective measurement is obtained using a machine or instrument.

As for other animal fibers, cashmere is tested for two main reasons. First, to ensure that processors purchase and producers sell fiber based on its actual characteristics. Secondly, to assist goat breeders to identify superior animals. Why are objective measurements necessary to assist with such appraisals? In short, because visual appraisal of animal fiber characteristics is very difficult and inaccurate because the human senses of sight and touch cannot be calibrated as accurately as some instruments and cannot consistently produce assessments with the required high degree of accuracy. Generally, the processor is concerned with sampling and testing relatively large lots of fiber. Most producers are more concerned with establishing fiber characteristics of individual fleeces, although at this stage of the industry's development, producers must now also

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**TABLE 1. RANGES FOR IMPORTANT CASHMERE GOAT AND CASHMERE CHARACTERISTICS**

| | |
|---|---|
| Body weight (kg) | 30 - 70 |
| Fleece weight (hair-in, unscoured, g) | 80 - 1,000 |
| Average fiber diameter (µm): | |
| Cashmere | 11 - 19 |
| Guard hair | 50 - 100 |
| Range of individual fiber diameters (µm): | |
| Cashmere (by U.S. definition) | 5 - 30 |
| Guard hair | 30 - 200 |
| Scoured yield (%) | 65 - 90 |
| Grease content (%) | 1 - 10 |
| Suint (%) | .3 - 4 |
| Mechanical yield (% of hair-in, scoured) | 10 - 90 |
| Fiber length (mm): | |
| Cashmere | 12 - 90 |
| Guard hair | 50 - 200 |
| Medullation (%) | |
| Cashmere (by U.S. definition) | 0 - 3 |
| Guard hair | > 90 |
| Color | White, tan, brown, gray, black |
| Style and character | Cashmere (definitely **not** cashgora or mohair) |

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consider testing larger accumulations of cashmere prior to sale.

Characterization of cashmere

Physical characteristics of primary interest to producers and textile manufacturers are summarized in Table 2. Standard test methods do not exist for six of the characteristics listed in Table 2. In these cases, current subjective assessments are summarized.

Sampling for yield and diameter. Detailed procedures for sampling animal fiber lots of different size are summarized in American Society for Testing and Materials (ASTM) Standard Practice D1060 (ASTM, 1996b). International Wool Textile Organisation (IWTO) Core Test Regulations (IWTO, 1987) were developed for sampling bales of wool but can be applied to bales of cashmere. Portable, electric coring tools having two-inch (5.08 cm) or half-inch (1.27 cm) diameter tubes are commonly used in the U.S. Typically, two-inch coring tools are used to sample bags or bales of raw fiber at the warehouse and mill. Subsequently, the two-inch cores are normally subsampled using a coring machine fitted with half-inch tubes at the testing lab. This same machine is also used to sample single fleeces. The half-inch core samples are then used in yield (scoured and mechanical) and diameter determinations. Overseas storage complexes and textile mills throughout the world are now using specially designed coring machines for sampling mohair and cashmere in bales. This form of sampling can only be used on relatively large accumulations of fiber. For individual goats, the sample submitted for testing is normally taken from the midside. Since variation in diameter and yield does exist between different body areas, other sampling points that have been used by researchers and may be considered are the neck, back and britch. However, if the fleece is shorn, by far the best way to sample a whole fleece is to spread it out and take samples with the assistance of a grid. This insures impartiality on behalf of the person doing the sampling and the sample thus taken has the potential to provide accurate yield, diameter, and staple length data representative of the whole fleece.

When samples are taken to evaluate an individual goat, it is very important that the age of the animal be recorded at the time of sampling. Cashmere goats produce progressively coarser fibers with increasing age. The time of year sampling occurred should also be noted since the mean diameter of growing down fibers decreases up to shedding time.

Scoured yield. Standard methods for determining yield (ASTM, 1996a; IWTO, 1985) have changed little since their introduction. Basically, the methods involve scouring samples in hot, soapy water followed by determination of residual grease, inorganic ash and vegetable matter content (ASTM, 1996c) on the dried, scoured fiber. Subsequently, "Raw Cashmere Base" (pure, oven-dry fiber) may be converted to a value known as "Clean Raw Cashmere Fiber Present" by dividing with a factor of .86 (in the case of the U.S. method). This is the factor required to adjust the raw cashmere base to a moisture content of 12%, an allowable alcohol-extractives content of 1.5% and a mineral matter content of 0.5%.

Mechanical yield of cashmere. In contrast to the scoured yield, this yield reflects the proportion of fine cashmere fibers that can be mechanically separated from coarse guard hairs. This value can be accurately assessed using tweezers to separate the two types of fibers followed by weighing of the separated portions using an analytical balance. This very slow procedure was replaced in two commercial labs (Australian Wool Testing Authority [AWTA] and Whatawhata Fiber Testing Centre [WFTC], now relocated to the Invermay Agricultural Center at Mosgiel, Otago, New Zealand and re-named AgResearch Fiber Measurement [AFM]) by the Shirley Analyser Mk. II Wool Model that uses a carding aerodynamic principle to separate guard hair from cashmere in a relatively short time (AWTA, 1989a and b). As a sample of scoured cashmere is passed through this machine, guard hairs are progressively removed from the bulk. Multiple passages (now standardized at 6) are required to remove a high proportion of guard hair.

Discussion. When cashmere fleece samples are tested by the AWTA or the AFM, scoured yield and mechanical yield are not measured or reported separately. These labs use a procedure in which the raw fibers are washed, partially dried and then subjected to Shirley Analysis. The separated portions (i.e., cashmere and reject fibers [guard hair]) are dried and the proportion of clean, conditioned

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**TABLE 2. CHARACTERISTICS OF CASHMERE**

| Characteristic | Applicable test method |
|---|---|
| Sampling for yield and diameter | ASTM, 1996b; IWTO, 1987) |
| Scoured yield | ASTM, 1996a; IWTO, 1985 |
| Vegetable content and type | ASTM, 1996c; IWTO, 1985 |
| Mechanical yield | AWTA, 1989a and b |
| Average diameter | ASTM, 1996e & g; IWTO, 1961; IWTO, 1993a and b; AWTA, 1989c; IWTO 1995 |
| Variability of diameter | ASTM, 1996g; IWTO, 1961; AWTA, 1989c; IWTO, 1993a; IWTO, 1995 |
| Difference in diameter between down and guard hair | ASTM, 1996g; IWTO, 1961, 1993a, 1995 |
| Staple/fiber length | ASTM, 1996d and f |
| Variability of length | ASTM, 1996d and f |
| Staple strength | Agritest, 1988 |
| Style and character | — |
| Luster | — |
| Color | — |
| Matted/felted fleeces | — |
| Weathered tips | — |

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cashmere is expressed as a % by weight of the original raw fiber. This is referred to as "yield" by AWTA and "down yield" by AFM. Unfortunately, Shirley Analysis does not provide a perfect separation between guard hair and cashmere. The cashmere portion contains some guard hair and vice versa. These amounts are not reported and are quite variable between samples. Thus, results of Shirley Analysis should not be considered absolute values. Estimated confidence limits ($P < .05$) of yield published by AWTA are summarized in Table 3.

**TABLE 3. ESTIMATED 95% CONFIDENCE LIMITS OF CASHMERE YIELD ASSUMING TWO SUB-SAMPLES PER FLEECE ARE SELECTED USING A GRID SAMPLING TECHNIQUE**

| Yield range (%) | 95% Confidence limits (%) |
|---|---|
| 0 - 19.9 | ± 3.5 |
| 20 - 39.9 | ± 4.7 |
| 40 - 59.9 | ± 5.7 |
| > 60 | ± 5.9 |

Nevertheless, values obtained in this manner are usually more consistent than visual assessment and were accepted by processors (e.g. Hugh Hopkins, Forté Cashmere Co., Inc.) since they apparently produce a good indication of commercially attainable cashmere yields.

In 1995, Lupton et al. reported on a new method of determining mechanical yield (and concurrently average fiber diameter of down fibers) using the Optical Fibre Diameter Analyser. The OFDA-estimated mechanical yields were consistently lower than the Shirley Analyser (SA) presumably because the authors had not accounted for the lower densities of guard hair versus that of down fibers (Herrmann and Wortmann, 1996). However, OFDA yields were shown to be highly correlated with SA yields, thus permitting reasonably accurate estimates of SA mechanical yield from a knowledge of the OFDA data.

The OFDA method is much faster and potentially less expensive than other methods that are being used to measure mechanical yield. Since only a small sample is used (typically 3 x 10,000 fibers are measured) the method is very susceptible to sampling errors. Great care is necessary in subsampling fleeces and subsequently in minicoring the samples. Several research labs are continuing to evaluate this method in the U.S., Australia, and Germany.

Diameter. A microprojection technique for determining average diameter has been the international industry standard for many years. In ASTM and IWTO standard methods (ASTM, 1996g and IWTO, 1961) short longitudinal sections are projected onto a screen using standard magnification of 500X. The widths of the projected images are measured using a standard wedge card or ruler. These methods allow for calculation of both an average and a measure of variability of diameter, either the standard deviation or coefficient of variation of diameter. Using the wedge card technique, a competent technician can measure 200 fibers in about 20 minutes. In order to obtain ± 0.2µm confidence limits of the mean at the 95% probability level when measuring cashmere (17µm), it is necessary to measure about 1500 fibers. However, since cashmere is so fine and uniform, a reasonable indication of diameter (± 0.4µm) can be obtained by measuring only 400 fibers. Fiber diameter measurements are often summarized in the form of a histogram.

Several U.S. institutions experimented with digitizing devices (Blakeman et al., 1988) for replacing the wedge card or ruler and allow for more rapid measurement. At this time, none of the innovative techniques have been incorporated into standard methods. For many years, there has been a need for an instrument capable of rapid and accurate measurement of fiber diameter and distribution. This need has now been met to a large extent by the introduction of the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Sirolan Laserscan, and BSC Electronics OFDA; IWTO, 1993a and 1995). These instruments represent the most innovative and modern concepts for determining animal fiber fineness parameters. Commercially, the instruments are used to measure dehaired cashmere as well as wool and mohair samples in the U.S., Australia, New Zealand, and in Europe. The laser and electro-optical techniques are both capable of measuring 2000 fibers, calculating a mean, standard deviation, and coefficient of variation and printing this information together with a histogram all in the space of three minutes. The Laserscan and OFDA are now fully accepted by the International Wool Textile Organisation for measuring diameter properties of animal fibers (IWTO, 1993a and 1995, respectively). Corresponding U.S. standard methods are currently being developed under the auspices of ASTM.

An FDA printout identifies the specific number of fibers present in each fineness category (1µm interval) contained in the sample and a cumulative percentage of each micron interval. The mean value, standard deviation (S.D.), coefficient of variation (C.V.) and sample size also appear on the printout. Mean value is calculated as follows:

In the absence of a computer, these values can be calculated manually using the convenient format outlined in Table 4.

Difference in diameter between cashmere down and guard hair. Mechanical separation of down and guard hair is virtually impossible if the averages of these two fiber populations are not separated by a significant amount (e.g., 30 µm). Thus, this is a critical parameter whether selecting goats for breeding or purchasing raw cashmere for processing. Figure 3 (not printed) shows a reasonably adequate separation of down and guard hair fibers. In contrast, Figure 6 (not printed) shows a much less desirable configuration, which is in fact more typical of a "cashgora" fleece.

Discussion. After commercially testing cashmere for several years, in New Zealand and Australia, it was finally agreed that calibration material for the new instruments should be standard wool samples (Batten, 1990). International Wool Textile Organization standard wools were chosen. Prior to this decision,

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Australian mean fiber diameter results were between 1 and 1.5 µm finer than New Zealand results. Table 5 summarizes the discrepancies as reported in the September, 1990 Ranch Magazine. The implications are obvious for people who used the services of the AWTA lab prior to this change or purchased goats based on AWTA data. Despite the potential shortcomings of using wool fibers to generate a cashmere calibration for the Laserscan and OFDA instruments, the labs are to be commended for their efforts to implement a universal calibration system. A subsequent blind round trial conducted by the author (Lupton, 1991), AWTA, and WFTC utilizing 45 cashmere and cashgora samples varying in mean fiber diameter from 15.1 to 21.4 µm resulted in very close agreement between the 3 labs. A summary of the trial is presented in Table 6. Typically, all 3 labs measure 1000 fibers. For a 17.50 µm cashmere sample having a SD of 3.50 µm, the 95% confidence limits of the mean is ± .22 µm.

Staple/fiber length. Commercially, mean fiber length determines the system on which the fiber will be spun (worsted or woolen) and the type of product into which the fiber will be manufactured. The standard U.S. technique for determining staple length (ASTM, 1996d) is simple, accurate but slow and requires only a ruler for measurement and a pencil for recording. This method can easily be adapted for direct measurements on the live animal. The ASTM procedure calls for "relaxed" staple length to be recorded. This method can also be adapted for length measurements on shorn cashmere if great care is taken not to disturb the down and guard hair in the shorn samples. Separate measurements are performed for the two types of fiber. In addition, mean fiber length can be determined using another technique on scoured, dehaired cashmere (ASTM, 1996f).

Current state-of-the-art instrumentation for measurement of staple length (predominantly for wool) is the CSIRO ATLAS (Automatic Tester for Length and Strength; Whiteley, 1984) and the Agritest Staple Breaker Model 2 (Agritest Pty. Ltd., Ryde, NSW, Australia). Several of these instruments are currently being used in commercial labs to provide (mainly) pre-sale data for wool buyers. I am not aware they have ever been used to measure cashmere.

As the name implies, guard hair is normally longer than the cashmere down undercoat. The long, coarse fibers literally guard the fine fibers from the elements and help maintain the cashmere in pristine condition. In contrast, cashmere being produced by some feral and meat-type goats in the U.S. is actually longer than the "guard" hairs. This is not a desirable trait and should be selected against in cashmere breeding programs.

Staple strength and position of
**Continued on next page**

$$\text{Mean} = \sum_{1}^{80} \frac{\text{number of fibers in µm category X µm value}}{\text{number of fibers measured}}$$

Standard Deviation = the square root of

$$\sum_{1}^{80} \frac{\text{number of fibers in µm category X (µm value)}^2}{\text{number of fibers measured}} - \left( \sum_{1}^{80} \frac{\text{number of fibers in µm category X µm value}}{\text{number of fibers measured}} \right)^2$$

$$\text{Coefficient of Variation} = \frac{\text{Standard Deviation}}{\text{Mean}} \times 100$$

**TABLE 4. TABULATION FOR CALCULATING MEAN AND VARIABILITY OF FIBER DIAMETER.**

| Micron category, $x$ | Number of fibers in micron category, $f$ | $fx$ | $fx^2$ |
|---|---|---|---|
| 9 | 3 | 27 | 243 |
| 10 | 6 | 60 | 600 |
| 11 | 12 | 132 | 1452 |
| 12 | 14 | 168 | 2016 |
| 13 | 24 | 312 | 4056 |
| 14 | 21 | 294 | 4116 |
| 15 | 30 | 450 | 6750 |
| 16 | 24 | 384 | 6144 |
| 17 | 15 | 255 | 4335 |
| 18 | 18 | 324 | 5832 |
| 19 | 9 | 171 | 3249 |
| 20 | 5 | 100 | 2000 |
| 21 | 7 | 147 | 3087 |
| 22 | 4 | 88 | 1936 |
| 23 | 5 | 115 | 2645 |
| 24 | 3 | 72 | 1728 |
| SUMS | 200 | 3099 | 50189 |

$$\text{Mean} = \frac{3099}{200} = 15.49\ \mu\text{m}$$

$$\text{Standard Deviation} = \sqrt{\frac{50{,}189}{200} - \left(\frac{3{,}099}{200}\right)^2} = 3.31\mu\text{m}$$

$$\text{Coefficient of Variation} = \frac{SD}{\text{Mean}} \times 100 = 21.0\%$$

## Objective Methods
**Continued from previous page**

break. Staple strength is rarely a limiting factor in the production of cashmere yarns. However, when weakness does occur in the staple this can have a serious effect on the efficiency and quality of yarn production. Thus, in some circumstances, it may become desirable to use an objective measure of staple strength. A range of instruments are available for this purpose and include the unsophisticated manual strength tester produced by Agritest (Agritest, 1988) at one extreme and the automated CSIRO ATLAS and Agritest Staple Breaker Model 2 instruments at the other end of the spectrum.

Subjective characterization

Style and Character. When applied to mohair, these terms are well defined. Style is the degree and uniformity of twist in a staple or lock (3-dimensional) and character refers to the size and uniformity of crimp or waviness (2-dimensional). Unlike mohair, raw cashmere does not have a well defined staple or lock structure. Thus, the two terms have sometimes been confused in cashmere terminology. Cashmere of good style (and character) has irregular crimp of relatively small magnitude and high frequency that does not lie in two dimensions but rather changes directions at irregular intervals along the length of individual fibers. This is particularly apparent when a tuft of cashmere is pulled apart and the fibers appear to be full of static electricity. The bolder and more uniform the crimp in cashmere, the more like mohair or cashgora it appears and the less desirable is its style (and character). Having said this, I must also add that many samples of cashmere that were shown to us in China in 1996 were obviously very fine, but had relatively bold, regular crimp and more luster than I would have thought acceptable. Ultimately, we must provide the type of fibers preferred by our buyer(s). So, if you know who you are going to sell to, be sure to find out their preferences particularly on these subjectively assessed properties. It can make a big different in price paid or even whether or not the buyer will purchase your fiber.

Luster. The best Chinese cashmere has very little luster. Some of the cashmere produced in the U.S. and in Australia exhibits low to medium luster. Although this type of cashmere can be truly fine and esthetically pleasing, luster in cashmere is usually indicative of Angora influence and, therefore, coarse fibers.

Color. Scoured color is a reproducible, measurable characteristic of wool. Both New Zealand and Australia have standard methods for specifying the color of scoured wool. Purchasers of white wool are actually more concerned with lack of color or whiteness. Nevertheless, the same instrument, a colorimeter, could be used to accurately specify the color of scoured, dehaired cashmere. Although classing of cashmere into color lines is traditionally achieved subjectively at the raw fleece stage, colorimeters could be used if/when more accurate specification is ever required on dehaired cashmere.

Matted/felted fleeces. This problem is common in cashmere goats when the animals are not shorn or combed prior to the onset of shedding. Because matted fleeces result in broken, short fibers in mechanical processing, it is important that this problem be avoided by timely shearing.

Weathered tips. Exposure of unprotected fiber tips to the sun and other elements results in degraded protein that will not accept dyestuff in the normal manner and which is brittle. Weathered tips have not been a widespread problem with cashmere down grown in traditional areas because these fibers are normally protected from the elements by guard hairs. However, it is quite common to see

**Continued on next page**

**TABLE 5. A COMPARISON OF MEAN FIBER DIAMETER MEASUREMENTS USING PREVIOUS AND CURRENT CALIBRATION METHODS**

| Previous AWTA result | Previous WFTC result | Current result from both labs |
|---|---|---|
| 13.9 | 14.9 | 15.0 |
| 14.9 | 15.8 | 16.0 |
| 15.8 | 16.7 | 17.0 |
| 16.7 | 17.6 | 18.0 |
| 17.6 | 18.6 | 19.0 |
| 18.6 | 19.5 | 20.0 |
| 19.5 | 20.4 | 21.0 |
| 20.4 | 21.3 | 22.0 |

**TABLE 6. COMPARISON OF MEAN FIBER DIAMETER AND DISTRIBUTION (STANDARD DEVIATION) MEASUREMENTS ON 45 CASHMERE SAMPLES AMONG THREE TESTING LABORATORIES**

| Testing lab | Mean fiber diameter (μm) | Standard deviation of diameter (μm) | Correlation coefficient with AWTA (mfd) | Correlation coefficient with WFTC (mfd) |
|---|---|---|---|---|
| WMRL | 17.55 | 3.46 | .9798 | .9820 |
| AWTA | 17.30 | 3.70 | — | .9848 |
| WFTC | 17.04 | 3.99 | .9848 | — |

Key: WMRL = Wool and Mohair Research Lab, Texas Agricultural Experiment Station, San Angelo.
AWTA = Australian Wool Testing Authority, Sydney.
WFTC = New Zealand Ministry of Agriculture and Fisheries, Whatawhata Fibre Testing Center, Whatawhata.

## Objective Methods
**Continued from previous page**

feral or Spanish goats growing cashmere that is longer than the guard hair. Since such animals are being used to establish cashmere flocks, problems with "tippy" cashmere might be anticipated.

Discussion

Advantages to producers and textile manufacturers of using objective rather than subjective methods to appraise natural fiber characteristics are well documented (e.g., Lupton, 1987). Producers are rewarded for shrewd use of accurate, objective information in their selection and management programs. Financial benefits to producers also accrue from payment of more equitable prices for their raw fibers.

Certainly in the New Zealand, Australian, U.S., and U.K. cashmere industries, objective measurements of raw cashmere characteristics have already made a large impact in selection and marketing fields and are invaluable tools in research. For U.S. producers to achieve sustained success in the cashmere business, they must take full advantage of the availability of objective measurements. Rate of progress will be optimized by emphasizing commercially important traits (e.g., cashmere production, fineness, and fiber length) in selection programs. Progress could be impeded significantly, as it has been in other species, by any preoccupation with development and subsequent conformation to "breed standards" and scoring animals using subjective appraisals of relatively unimportant characteristics.

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# Calendar of Events

**January 10, 1998**
Oregon 4th Annual Pygora Goat and Fiber Frenzy
Washington County Fair Complex Armory Building, Hillsboro, OR, 10 am - 5 pm, free admission. Vendors, demos, goat show, food, fun! For more information contact Lisa Roskopf, 51920 SW Dundee Rd, Gaston, OR, phone 503-985-3331

**January 10-25, 1998**
National Western Stock Show
Including cashmere goat show January 15th
PO Box 16181, Denver, CO 80216-0181

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**Like football players across the nation, the boys are butting heads in the crisp fall air. Testosterone is at all-time highs. With sights and sounds reminiscent of "Wild Kingdom," or a political convention, they are attempting to establish a new pecking order, and vent the frustrations of another breeding season gone by. Maybe next year...**

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# 1997 ECA Fleece Competition

**Judge: James Barton**
**Total number of entries: 131**

**SHORN FLEECES**

**Doe Kid Fleeces** (9 entries)
AKF YS112, R. and H. Jensen
**Doe 2nd and 3rd Fleeces** (8 entries)
HKL Devlin, K. and C. Heeren
**Doe 4th Fleece or Before** (17 entries)
HKL Licorice, K. and C. Heeren
**Buck Kid Fleeces** (6 entries)
BPC Fortune, W. and M. Ackley
**Buck 2nd and 3rd Fleeces** (4 entries)
BPC Easter, W. and M. Ackley
**Buck 4th Fleeces or Before** (2 entries)
Gwilliam, C. and M. Nielsen

**COMBED FLEECES**

**Doe Kid Fleeces** (13 entries)
NLF Emma, C. and M. Nielsen
**Doe 2nd and 3rd Fleeces** (20 entries)
TD Luccia, Toni DeVenney
**Doe 4th Fleeces and Before** (22 entries)
CRR Abby, P. and T. Rosengarten
**Buck Kid Fleeces** (13 entries)
SF Sebastian, R. and A. Repaske
**Buck 2nd and 3rd Fleeces** (10 entries)
TD JR, Toni DeVenney
**Buck 4th Fleeces and Before** (4 entries)
MLB Imagine, Yvonne Taylor & Becky Wright
**Wethers** (3 entries)
Michael, Jeanne Austin

# 1997 ECA Goat Show

**Judge: James Barton**

**DOES AND WETHERS**
**1997 DOB (milk tooth)**
Josephina, C. and L. Raney
**1996 DOB (two tooth)**
Michael (wether), Jeanne Austin
**1995 DOB (four tooth)**
SF Corelli, R. and A. Repaske
**1994 DOB (six tooth)**
Annabel, Christy Proost
**1993 DOB or before (full mouth)**
BLF Gwydion (wether), Yvonne Taylor

**Grand Champion Doe**
SF Corelli, R. and A. Repaske

**Reserve Champion Doe**
Annabel, Christy Proost

**BUCKS**
**1997 DOB - milk tooth bucks**
SF Handel, R. and A. Repaske
**1996 DOB - two tooth bucks**
BPC Fortune, W. and M. Ackley
**1995 DOB - four tooth bucks**
SF Shubert, R. and A. Repaske
**1994 DOB - six tooth bucks**
BOGF Dakota, W. and M. Ackley

**Grand Champion Buck**
BOGF Dakota, W. and M. Ackley

**Reserve Champion Buck**
SF Shubert, R. and A. Repaske

ECA offers appreciation to our friends in Washington, Oregon, Nevada, and Nebraska whose participation helped to make this a meaningful competition and to James Barton for thoughtfully evaluating 131 fleeces and 55 goats in one long day.

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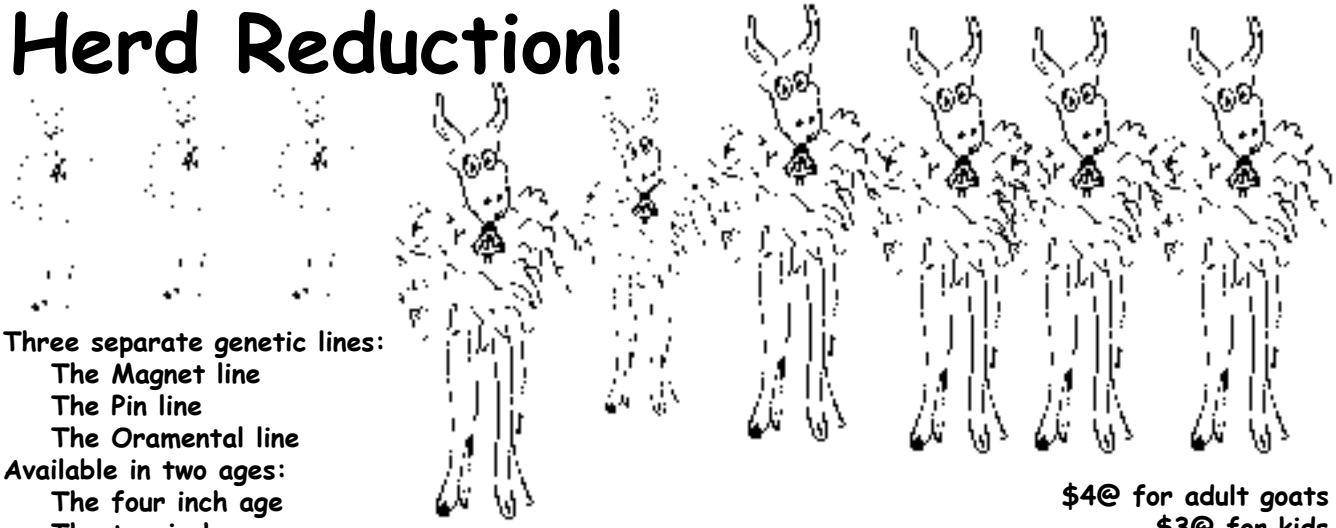
**Cynthia Heeren, *Membership Coodinator*, 22260 East Hwy 20, Bend, OR**

# Herd Reduction!



Three separate genetic lines:
- The Magnet line
- The Pin line
- The Oramental line

Available in two ages:
- The four inch age
- The two inch age

Available in a variety of sexes:
- You'll have to do some pretending on this one!

These goats are healthy and durable:
- See article on page 4
- Made of genuine cashmere, clothespins and other stuff
- Machine washing is not recommended

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$3@ for kids
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