

**HALF PUBLIC, HALF PRIVATE, ONE WEST:
Innovation and Opportunity Across Boundaries
2005 Conference
Thursday, January 13, 2005**

Minor Breeds, Major Opportunities

Facilitator: Gary Nabhan

Director of the Center for Sustainable Environments at NAU
“Matching Minor Breeds with Desert Needs”

This is a special topic session that evolved out of discussions with Courtney White and Deborah Madison last summer when the Quivira Coalition had an event up in Santa Fe. And we're trying to link some interests shared by many of you in this room that have to do, not only with the conservation of land, but the conservation and utilization of regionally adapted livestock breeds. And there's a number of you who are in this room that have deep knowledge and understand, both of the management of these breeds and the marketing and promotion of them.

So we're going to have three sort of introductory talks, and then a very fine group of panelists, including Carrie Balkcom from American Grassfed Association, Betty Fussell who is a world renowned food writer who is exploring the history of beef on this continent and is going to give us a vocabulary to talk about the different tastes and textures and qualities of this incredible variation that's out there. And Jim Bill Anderson and Ginnie Cates are also going to join us and talk from their experience with Corriente cattle.

I'm probably going to be the shortest, not in height, but in the length of my talk. I'm going to go through some introductory comments that will sort of weave some things together. Again, I am not a rancher. I raise Navajo Churro sheep and Heirloom turkeys on a very small scale. But there's many people in this room that can give you a level of detail, including Don Bixby, about how these rare breeds can be integrated into sustainable land management in greater depth. So I'm just going to try to give some unifying themes that I think you'll hear echoed in much greater depth as the evening goes on.

Again, I want to acknowledge two projects that have given funding to this, the Renewing America's Food Traditions, Coalition of Slow Food, Chef's Collaborative, American Livestock Breeds Conservancy that Don's with, Seed Savers Exchange that Kent Whealy is with, Native Seed Search, which I helped co-found some 25 years ago when I was just a six-year-old, I think. And Cultural Conservancy, and I think I mentioned Chef's Collaborative, too. And Carrie Balkcom is also on the board of Chef's Collaborative, so she can speak to their interactions with these very fine groups.

The second project that has helped putting up the money for some of the travel and participation of these fine friends of mine is the Canyon Country Fresh Network that's helping with direct marketing in northern Arizona and adjacent areas, especially during this period of drought. So I'm grateful to the support we have, the collaboration, of course, of Quivira Coalition to make all of this work.

So very briefly, a lot of the sustainable land management strategies that many of you are experimenting with have been done out of a great deal of good will and ingenuity on your parts. And often are jump started with small grants or very small initiatives. I looked at the Swigla budget at the meeting, and a tremendous amount of work has been done on just some \$14,000 of jump started support. But to make these things stick in the long run, the land management and the livestock management not only has to pay for itself, but it somehow has to sustain these experiments that many of you are involved in. To think that this can all be supported from the outside, from other sources, rather than really having your neighbors help pay for the values that you have imbedded in the products that you produce on your lands, I think, is happening in a few places temporarily. But I've seen just within the last couple years, as foundations have dropped their support for some of the rangeland conservation and restoration experiments, that even some of the land trusts have been hard pressed to keep their projects moving. And I think it's time for us to really talk about making the consumers help pay for the investment that you-all have begun to make on both the land conservation and the livestock conservation.

So different talks tonight will integrate four strategies for increasing the economic viability of ranches. Quivira, obviously, has focused in all of its conferences on how we can do sustainable land management in all its various forms. And the influence of Jo Robinson and others have brought into grassfed production and the interesting qualities, nutritional and flavor, that are associated with grassfed or grass-finished meats that many of you are promoting.

The direct marketing is also a part of several sessions here and has been in the past. And I talked about it, I believe, two years ago. And yet, we've seldom gotten around to talking about how the genetic conservation of some 25 livestock breeds that are at risk in North American can be integrated into these plans. And Don will be giving you a much more ample perspective on that in a moment.

But you'll hear various combinations of these four strategies spoken about in the next hour and half or so. And again, what we're really talking about here is seeing how we can have some market-driven solutions to sustaining these conservation efforts. To meet the long-term needs of your land. And that's finding niche markets of consumers who share values with you that are willing to invest in you, not merely for good-tasting meat, but understand all the various implications of what you're doing to protect or restore your local environment.

When we talk about meeting rangelands or arid-land needs, specifically, various Quivira Coalition meets in the past have talked about how goat, sheep, certain breeds of livestock, can help in pruning back shrubby increasers, removing invasive plants. We've talked about thistles and a number of other invasive, including exotic weeds, that particular kinds of livestock go after in a strong way. Maintenance of cover on dry slopes like some of the experiments that Dan Daggett's been involved in. Thinning of post-flood saplings. You can also have too much too quick in some places. And for the vegetation to mature the way you want to be, sometimes pulse grazing helps maintain some balance of your forage resources. And then fire risk reduction is going to be spoken about with a Payson experiment with goats during this meeting.

Okay, there is another way that we can match livestock breeds with conservation mandates. And that's by using them in a more conceptual way to fulfill certain conservation mandates of various land management schemes. For instance, a land trust could write into their objectives that they are not only trying to protect or conserve the land from subdivision and habitat fragmentation, but they could put genetic conservation as an objective. Conserving the livestock diversity of their region as an objective for what they're doing with the land trust. And help increase the herd sizes, like Kent will be talking about this great need there is with the Ancient White Park Cattle to get more growers, trying to get the population sizes up.

There's certain conservation ranches that are a mix of private, state and federal lands, and on BLM lands in particular, you still have to run a certain number of cattle on them, or livestock on them. Conservation easements can be written to say that these breeds are of historic significance, just like you can have conservation easements for historic buildings. So that can be written into a conservation easement deed restriction for short-term or be one of the objectives that are in the mix of long-term objectives. And the new conservation security program could integrate these into grazing management plans.

We're going to focus on, in different talks, on two animals in particular, the Criollo-Corriente cattle, and there's going to be talk a lot more on that, so I'll not blather on. And the Navajo Churro sheep and, I believe, that Antonio Manzanares has spoken at previous meetings here. But there is a lot of information we can pass on to you about them, if you're interested. And again, my wife and I raise Churros.

Why these breeds? Both of them have spent more than 300 years adapting to the particular conditions of this region. And they've also, in a sense, pre-adapted to similar conditions in the Mediterranean before they arrived in the Southwest. They're animals of scrublands, as much as grasslands. So it's, one Navajo friend of mine says, Could I market my Navajo Churro sheep as sage-fed instead of grassfed? Why not? But the point is that they are very efficient users of woody browse, particularly legumes.

There's a revival of interest in their novel products. I'll get to that in a moment.

Ed Frederickson, who is here with us from Jornada down in Las Cruces, has been looking both at the Corriente and the Chinampos. The Chinampos are related to them, brought in about 1680 to Baja, California. And he has some schemes to get some of that genetic resource into the US again. But the Chinampos in particular have a degree of salt tolerance that we don't find in other of these Criollo strains, including the Sonoran-Chihuahuan-derived Corriente's. There's this huge demand from amateur ropers in rodeos that gives a jumping-off point for people willing to invest in them right away. There's some quick returns so you can rent out steers for a couple years and then get them back after they've been used by ropers, if you want to go that route.

And then all the things that Jo Robinson has talked about, in terms of the qualities of the meat, used to be laughed at by ranchers. That Corriente's wouldn't come up to grade, and now there is a market for them. So that whole situation has flip-flopped within the last decade.

The Churro sheep have been largely thought of as unique because of this double fleece that, and Pendleton blankets is now going to release this summer the first 100% Churro wool Pendleton blanket. So if any of you are interested in those, contact me after this. But there is also other qualities of the Churros besides the wool, including their resistance to parasites and foot rot. We just had a bunch of lambs during the biggest storms that we've had in 7 years. And of course, all our ewes lambed on the biggest storm night and didn't need any assistance at all. We needed assistance, could have used it.

And Jim Bill Anderson will join us on the panel to talk about how he's integrated Corriente's into a wide variety of conservation objectives that he's done there, including this tandem project with the Lesser Prairie Chickens.

And Jay Begay, who was originally planning to be with us tonight that's from the Navajo reservation, has been involved in a fire risk reduction project in Prescott National Forest that's very parallel to the one that you'll be hearing about in another session that's occurring in Payson, Arizona.

So I want to honor the many people who have already put some of this in practice on the ground in ways that demand currently outstrip supply for both of these animals, you might want to interpret that cautiously. But it's a good time to do this. Because previously there weren't markets. The Churro sheep was going for five cents a pound for wool just a few years ago. And now, thanks to a number of direct marketing, niche marketing efforts, the Navajos are getting \$2 a pound at wool buys. And that's a huge difference from what it was just five years ago.

If you're going to try to integrate these animals into your operation, define your objectives clearly, as Yampa Valley beef has. Of course, as the Hatfields in Oregon

Country Beef have not only put down on paper, but implemented. They've talked the talk that they've said. And here's a proposal for how we could develop a mission statement that includes the genetic conservation of breeds for ranch in the Southwest.

... utilize heritage breeds adapted to the Southwest, manage the livestock in particular for genetic conservation objectives, among all those other objectives for sustainable land management. And that's a lot to read in one slide. So I apologize if I flick it off before you're halfway through, but we'll come back to some of those things.

Knowing your niche market is key. And Don Filmeny and other people up at Colorado State have talked about the various values that consumers are now looking for when they buy meat. And Don'll talk about the status of, the best terminology for heritage breed. Natural is still a widely ambiguous term that changes in definition and consumer demand very rapidly. So people are going to some of these other things.

Carrie will talk to us about the current status of these efforts to have a legal definition of grassfed. Some of you who were in the Swigla meeting heard some of that debate. But she can update you on that better than I can. So essentially ignore this proposed rule until Carrie talks to you in more depth about that. There are some real problems with the way, the implications of this particular definition.

And then, of course, there's other labeling claims that you can integrate into your marketing strategies and other branding or labeling options, including "predator friendly" that Will and Jan Holder and some other folks in Montana pioneered. A link to the slow food ____, and Deborah Madison will probably comment on that briefly at our Saturday night banquet.

State regional or watershed based branding campaigns. And there are some very interesting things going on in Iowa, where you put the date that an animal was processed and the distance that it traveled. And consumers really, really like that strategy in Iowa. So there's some other interesting things that people can do.

The main thing that we suggest to people is to tell your story of your relationship to the land and to that particular breed and to your management system in the most vivid terms possible. You don't have to self-promote, but really tell your link to the land in a story kind of sense that gives the consumers a human face to go with whatever product they're investing in.

Is this stuff economically viable? We did, just did a statewide poll with a social research lab at NAU. And over a million people projected out from our sample size are willing to pay more for beef, lamb and mutton if it's range-fed, Arizona packaged, and traceable back to a source. Mad Cow Disease thing really upped the ante for people being able to trace their meat back. And even though it does not appear that that's a major *real* threat

to the meat industry, it is a perceived threat among certain consumer groups still, and the traceability and a human face related to that food is what people want. So this is not an insignificant market. We aren't anywhere near saturating it in Arizona or any other state.

Finally, I'm going to go through these two really quickly. Yes, the market opportunities are expanding. And one way to look at this is that all the efforts going into sustainably harvested foods, natural foods, organic foods, grassfed, that diffuse collection of efforts now has a growth rate greater than Wal-Mart's. This is not insignificant. And you may wake up in the morning and say, What I'm doing is a damn drop in the bucket. But if you collectively look at all the wonderful work that all of you are doing, it's more significant than the largest food supplier in the world right now. The single largest food supplier in the world right now.

Tell the stories of your land, as I said. Draw upon the government and nonprofit programs willing to assist you. If you don't like the government, join up with the nonprofits. They have less red tape. But take advantage of these things to help buffer you from the pain of all those start-up costs or reorientation costs.

And then, remember that there are these bottlenecks. That it takes more work to do direct marketing. There are still problems. As the Swigla group said, with the lack of slaughterhouses and USDA approved kill plants in the Southwest, that there's some fickleness of the natural product consumer, who is constantly redefining the values that they want to see in their meat or in their vegetables or fruits. That's actually creating more niche markets, rather than less. But it's constantly changing, and so you have to keep educated and follow these trends. And there's a number of organizations that can help you do that.

And then, direct marketing, dealing with weird breeds is not everyone's cup of tea. But there's some people that don't want to get out of their comfort zone. So, metabolically, some of you are adapted to trying these experiments. Others of you are not. And that's really important to remember. We aren't trying to convert you. None of the people are here. If you have these inclinations, consider this information. If you like the way you're doing things now, keep on doing the good work you're doing.

With that, I'd like to introduce Don Bixby, who spent the last quarter century really making the connection between the unique qualities of various livestock breeds and the possibility for integrating them into sustainable land management. He was the director of American Livestock Breeds Conservancy based in Pittsboro, North Carolina, for most of the last quarter century. And now, he's special projects director for them, and still very much involved in this. And probably knows more about the myriad possibilities than anyone else in the US. Don ...

Don Bixby, American Livestock Breeds Conservancy
“Matching Livestock Breeds with Land Conservation Needs”

I’ve just been told I can only go forward. I can’t back up. That’s fine. I’ve spent 25 years going forward, and we’re finally making some progress. I think the American Livestock Breeds Conservancy is one of those organizations that sort of an overnight success, based on 25 years of work.

When I first became involved, as a practicing veterinarian, with this organization, the work that we were doing was considered extremely peripheral. Any time that I talked with animal scientists, or cooperative extension people, or USDA, this was always considered complete nostalgia. We had the best of everything. We didn’t really need anything else.

Well, 25 years of showing that we *didn’t* have the best of everything. Because times keep changing.

It’s a real pleasure to be here in the Southwest again. I’m certainly an Easterner, I guess, but I have a warm place in my heart for this part of the country, and for rangeland and for grass and grazing creatures.

So we’re going to talk mostly about grasslands tonight. Because they cover a huge portion of the earth. Most often, they are arid. But even the most arid of grasslands have mixed flora, a wide range of plants that provide a diversity of plant life. And they have mixed fauna, primarily herbivores. Although there are always predators that go along with the herbivores.

Primarily, these grasslands are not conducive to farming. And so, over the millennia, pastoralists have developed ways of managing livestock, which have replaced most of the wild species.

This is a photograph from the Southwest, and you can’t really tell. But like most of the pastoralists around the world, this is a mixed species flock. There are sheep, goats and horses here. But in other parts of the world, there would be cattle, camels, llamas, vicuña, a wide range of grazing animals that can take advantage of the forage that grows on these grasslands.

Our domesticated livestock evolved from one or more wild species. Most of the wild relatives are extinct. We don’t have wild sheep that are the same species as our domesticated sheep. This happens to be a Rocky Mountain sheep, but it’s a different species altogether than our domesticated ones. Selection has continued to meet the human needs or wants. And so, our history has been to adapt, or select, livestock to meet our environment or our management systems. But over the last 50 years, the trend really

has been to change the habitat and select continually for a very narrow range of characteristics in each of the livestock species. We'll talk some specifics, beginning with sheep. Because I think they are one of the most interesting species in that they've diverged in so many different ways.

The early hunters and gatherers subsisted on sheep because they were fairly easy to catch. But they also began picking the fleeces that the sheep shed off trees and brush and so forth and developed a rudimentary textile system. But with domestication and selection, the hair on the sheep, that we saw on the Rocky Mountain sheep, disappeared, essentially, to be replaced by fleece. And so a dependence evolved between sheep and humans, just as it has with all the other livestock species. Because the largest clip of fleece now belongs to the Lincoln breed, of over 75 pounds in one year. Well, if you can consider 150 pound sheep with 75 pounds of wool on its back, there is a dependence there. Somebody has to take that off. And one of the big issues with these long wool breeds is that they sometimes cast themselves. They get turned upside down like turtles, and they are unable to right themselves, and they'll suffocate.

The earliest of the breed select improvers was Robert Bakewell, who's shown here on a Cleveland bay horse. You probably thought that was the man from Quaker Oats. But in the late 1700s, he began doing some very interesting selecting. His revolution involved keeping pedigree records, which had never been done before, and also selecting for the best stock in each generation for the following breeding season. Up until that time, the largest and most thrifty stock had been sent to market in the fall, so they didn't have to be kept over in the winter on stored feed. And so, in the spring, all we had was these little scrawny things. Year after year, they got scrawnier and scrawnier. But he instituted both of these processes, along with it (?) line breeding. We call it line breeding when it's successful, and we call it inbreeding when it's not.

You probably can't see this pedigree, but on this pedigree – these are English longhorns, by the way. Not Texas longhorns. And they're not related at all. But in this pedigree, there's a bull named Two Penny, who appears in several generations. And I think this may be the source of the term getting your two cents' worth in.

He also worked on developing the fleece of the local sheep and developed the lesser long bull, which is a breed that was allowed to become extinct in this country. The folks at Colonial Williamsburg re-imported them from Tasmania because they were appropriate for the historical period that they were representing and have taken a, really, a leading role in the conservation of this breed in North America. By developing satellite flocks, mostly in the Mid-Atlantic States. Although there are now some in Canada and in Wisconsin. The population is now about 4-500 breeding animals. These are very unusual sheep because the fleece is so long and open and dense, and it glistens. There's a real sheen to the fibers.

This is the Lincoln sheep that I mentioned earlier. In addition to selecting for white wool, of course, sheep breeds come in many different colors naturally, including this black Lincoln, and we'll talk about some others a little later on.

Besides the long wool, these fine wools came originally from Spain, merino, that was selected in many different countries to develop the Saxony merino, and the Rambouillet and this Vermont merino that was selected to have all these wrinkles. The idea was that there would be a lot more fleece on a sheep like this. But if you've ever shorn one of these with hand clippers, and you have four or five hours to do it, and lots of band aids, you realize why this particular strain of merinos is no longer popular.

And we still have hair sheep. These, this is a Barbados black belly from the Caribbean. It's quite different than many of the Barbados sheep that you'll probably see in the Southwest. Because it has not been influenced with muflon and Rambouillet. It's generally a poled breed, fairly good stature, excellent forager, heat resistant and parasite resistant, and foot rot resistant. And finally, many of the Caribbean countries are recognizing that they don't need English-type sheep in their climate. That they should be using climate-adapted sheep to provide local lamb, instead of importing it from the US or New Zealand or Australia, which is helping to revive some of the agricultural economy in many of these island countries.

And the cotoden sheep I put in here because this is an example of why we need these old breeds. They are now, they seem to be called Heritage breeds. But we're also talking specifically about Heritage breeds that need conservation, that is, rare breeds. Holsteins and Angus are Heritage breeds, too, although we've done some pretty horrible things to them. But the cotoden is a newly developed breed from the 1960s, utilizing the St. Croix from the Virgin Islands and the Wiltshire Horn, both of which are hair sheep. And they were crossed with some Suffolk and Dorset and Gulf Coast Native sheep. This is a sheep that doesn't need to be shorn. It does have a fair degree of resistance to foot rot and parasite resistance. They are natural lambers and have become very popular. You would think these would be a breed of a warm climate. But in fact, they were developed in Maine near Mount Cotoden at the Peel Farm. And they've been popular in practical every state in the union, as well as huge imports into Canada and Mexico and into the Philippines.

Here's our friend Pearl Sunrise with Navajo Churro sheep that Gary has talked about already. And you can see the range of colors that have been selected in this breed. There's great value in colors for traditional weavings. Because they impart the color without the dyes, even without vegetable dyes. Some of the particular trading posts like Two Gray Hills have specialized in natural colored fleece weavings.

And as you can see, these are sheep that are well adapted to a pretty rough-looking pasture. Probably most of you folks wouldn't gasp, but when I show this in Virginia or

North Carolina, they wonder what these sheep are eating. And maybe they are, I don't know.

And here is a really handsome brown ram, a picture that I took up near Taos. I've been working with the National Animal Germ Plasm Program headquartered in Fort Collins. Some of you have probably heard of the seed bank there, which was established in 1956. But in 1999 I was on the, I was the only non-academic, non-government person on a committee to help establish a gene bank for animals at Fort Collins. And one of our early projects has been collecting semen from Navajo Churro rams. First on the reservation, but we will also be collecting rams from across the country. The idea is that the semen and embryos eventually will be put in liquid nitrogen for long-term storage in the event there is a disaster affecting any of these breeds that we're working with. We can also in the future remove some of that genetic material and reincorporate it into the living population.

We don't really know how long we can freeze this material. Because the technology for cattle is just over 50 years old. But semen that was taken in the 1950s and deep frozen is still viable and is being used. So it's kind of an exciting thing to think about for conservation of some of these breeds of smaller populations.

I mentioned mixed species grazing, and to understand why these work, is we have to understand that these animals are all different. This little diagram up in the right-hand corner is not a barn dance, but it reminds us that all of these creatures have different feet. And their feet interact with the soil and the forage in different ways to help break up the crust, to break up dried vegetable matter and help in recycling the nutrients back into the soil mantle.

Each of the species has a different way of gathering its food and utilizing it. There's the horse, with the very prehensile lips, so that they can eat very close to the ground. They can also de-bark trees quite nicely. And next to him is a rooster with a very pointed beak for extremely discreet foraging. If you've ever watched chickens eat, you wonder what *they're* eating. But they'll peck along on invisible things to supplement their diet. And of course, the pigs at the bottom are doing what pigs do best, and that's exploring for some tasty treats.

The cattle are sort of the prime grazers, I think, around the world. It's a breed that has been very successful in many, many cultures. This is a picture of the Texas longhorn, which is the only breed that has had government support up until 1999, because of its brush with extinction. In fact, this is still a very important conservation program. The numbers of Texas longhorns have certainly increased. But many of the old ranch lines are disappearing. And in fact, some of them may have disappeared. So conservation of some of these lines might be very useful.

Cattle are certainly grazers. They prefer grass, but many of the older breeds will relish natural pasture and are browsers. They also collect their feed in a different way from many of the other herbivores that we're talking about. This picture shows how their tongue wraps around it, and I'm sure most of you have watched cattle gathering grass and ripping it out with their tongues, rather than biting it off. For those of you who don't know about ruminants, most of them don't have teeth at the top. It's just a dental pad. So they don't, they're not terribly efficient at biting off grass, especially cattle. And the cattle have a rather solid upper lip. So it's not terribly flexible, compared to the horse or to the sheep and goats. And you've heard about the four stomachs of the ruminants. This great, big vat in the back really works like a compost bin. It's loaded with bacteria, protozoans and other microorganisms that break down the cellulose and other products in the forage so that they are usable for ruminants to eat. People can't eat grass. We are just not built to digest it. So it's good that we have ruminants to help us collect some of the wonderful solar energy that's stored in the grass.

We have a wide range of genetics available, all the way from this little Dexter, which doesn't show up very well, to a very large milking shorthorn. And belted Galloway, the sort of the scenic cow that has become extremely popular. This is a breed that was once very, very rare, a relatively recent import from Scotland. But has almost gone off our conservation list because it has become so popular, particularly with small holders, farmer dentist and farmer physicians and farmer attorneys.

Both of these are Scottish breeds from the other side of the country from the Angus, and they are built for extremely challenging weather, cold and rain and snow. But one of the interesting things about these adapted animals is that they are adaptable. North Carolina, in fact, is the state with the largest number of Galloways, even though it's a pretty hot climate. And here's another of the Criollo breeds. I mentioned the Corriente, the Texas longhorn is a Criollo. This is the Florida cracker. And the Pineywoods is a fourth of the Criollo breeds that we have in this country. Criollo means that it's, was born in the New World but is of Spanish origin. So there's Criollo cattle and sheep and folks who were talking earlier about Criollo cuisine. And if you travel in Central and South America, you'll hear this term much more frequently, or at least than we do along the East Coast. You may hear it more frequently here.

And this is the milking Devon. This is a New England breed. I have to throw it in here because it's the pilot breed for the American Livestock Breeds Conservancy. It was first documented in North America in 1623. It was brought to this country as a draft animal, to help clear the land for timbering and plowing. And it has persisted as a draft animal in New England. Ox pulls are big deal there. Every county fair has an ox pull, and there's great competition. And these animals are renowned for their speed, for an ox. And their agility and their ability to work in the wood lots with two people on either end of the delivery system, one loading the ox and team up, and the other unloading. And the oxen go back and forth by themselves, hauling timber. You can also do that with plowing with

these guys. And in fact, there's a fellow in Texas whose name has escaped me right now, who has used these in a crossbreed with, breeding program with longhorns to produce Texans. And they have a really good carcass quality and have been very successful, probably because of heterogeneity, the hybrid bigger (?). Here they are in New England.

And then the ultimate browser, people say go through in grasslands. But they only refuse to starve to death. And once the grasslands are gone, they'll find something else to eat. They are also pretty good at clearing abandoned fields and property that's been allowed to become overgrown. These are African goats that I met personally. And this is the Boer goat, I'm sure all of you are familiar with the Boer goat. But you would not believe that those little creatures up in the tree are the predecessors for this goat. Boer goat means it's the farmers goat, and it's the improved, it's the beef goat. It's what we have for Aberdeen angus, and they do best with good grazing and supplemental feed. But we have some really excellent meat goats in our own country, the Tennessee fainting goat and Spanish goat. These have been part of the Southern agriculture for hundreds of years.

Explain the fainting ...it was about Elvis, wasn't it?

Yeah. The fainting goat has this mythological background. We really don't know where it came from. But it's a genetic condition that makes it tense its muscles up. It's properly called myotonia, which means muscle tone. And this is a condition that occurs in people as well. So they've been studied extensively at Vanderbilt University Medical School to understand this condition in people. It is genetic, and it's variable. There was a time back in the '80s when dwarf bowling was popular and fainting goat contests were popular. But fortunately, we've gotten past that, and people have recognized that dwarfs are really good for TV programs, I guess, and the fainting goats are really better for meat production. It's a very thrifty goat. And because they're always tensing themselves up, they have an excellent carcass quality.

And I don't have to tell you much about angora goats, but this is certainly a fiber goat that would do well in mixed grazing on arid lands.

And the Spanish mustang horse is, of course, ideal for the Southwest. Because it's been here for 400 years adapting to this environment.

Donkeys are often overlooked. They thrive on forage. They can be great guard animals, and they are very cute and lovable. There is also a sort of a renaissance in riding mules right now. And of course, donkeys are necessary, along with horses, to make riding mules, especially these mammoth jacks over there on your left, have become very popular. And we're seeing a lot of trail rides based on mules. Mules also work very well for people who have a horse in the backyard and ride it every three months. Because

donkeys and mules can remember what they're supposed to do for three months. Horses don't always.

And then the pigs. Pigs are a big issue in the southeastern United States. North Carolina has been taken over by the swine industry. We have some counties where the pig population exceeds the human population tenfold. In fact, there aren't enough people to work in these factories. And so we're having migrant labor come in, who can only stand the work for some number of months. The turnover in these places is horrific. We're working with a Kellogg grant now to develop independent marketing program for independent farmers to raise pigs and market them through a cooperatively owned processing plant and a distribution system that includes the environmental organizations in the Triangle area, that's Raleigh Durham and Chapel Hill. There's a lot of environmental organizations there, and they've been decrying the swine industry. But they haven't really had an alternative. So we're trying to get these people to put their money where their mouth is and to be buying this pork to support this enterprise. Pigs really work very well on, in mixed enterprises, because they utilize such a wide array of what would otherwise be waste products. They are also great to recondition fields, getting rid of a lot of the trash plants.

These pigs are being raised with a very little amount of grain and clover fescue pasture. When I first started working on this project, I kept getting in touch with my swine colleagues, trying to figure out what pigs needed on pasture, and they all told me, Pigs can't use pasture. They only eat corn. But in my mind there was this phrase about happy as pigs in clover, and I couldn't figure out why pigs would be happy in clover if they weren't going to eat it. And here are orchard pigs that were developed in the southwest of England, to live in the orchards, to eat the drops from the trees, clean up the orchard floor, eat all the shrews and moles and voles and things. And then in the fall, they were fattened on the pumice, the solid that's left over from pressing cider. And taken to London as special apple flavored hams. A very interesting and lucrative niche market.

Well, here are pigs in clover, at North Carolina A&T. And this is a project that one of my colleagues is working on with some Ser (?) grants that Gary was mentioning, trying to figure out other ways to raise pigs. This is a red clover pasture. He also raises pigs in the woods to see if the temperature variation in the woods would help with production, several other projects.

And if any of you are raising gardens, pigs work very well in these tractors to recycle nutrients from kitchen garden waste. Here's an organic farm in southern Virginia that prepared squash beds with their pigs. At the end of the season, they had \$3,000 worth of organic crook neck squash and three pigs for their freezer. And they had perfectly prepared beds for the next planting season.

Here's the ideal product from a pig tractor.

Chickens work really well following cattle, sheep. They're great foragers. Some of the older breeds will really get out there and do a good job of working on seeds, weed seeds. And they help with parasite control by eating the larvae out of the cow pies. And they help by flipping those cow pies over if your timing is right, so that the nutrients get back into the soil and you avoid this ring of abhorrence that cattle hate so much.

Those were Dominic chickens, which is a breed well documented in the 17-1800s in the US. Almost disappeared, but it's a breed that lays these multi-hued eggs that have been, that are really popular. People love to have brown eggs. They think that's much more nutritious and much more nutrient value than white eggs. Most chicks start out like this. They think whoever is attending them in the brooder is their mother. And then they get to live in these terrible houses with very little room to grow, no fresh air. So this idea of pastured poultry has really come on rather strongly. And this is what we are hoping for, is that chickens will be outdoors eating bugs and plants and legumes and exercising in the air.

Ducks and geese have really been overlooked in this country. But geese are herbivores, they will, you can raise geese on pasture alone. They don't need to have grain. And hungry, I saw great flocks of geese, thousands of them, in pastures. And every morning for breakfast, we had goose sausage. The main product was the foie gras, the liver of the goose. But instead of hamburger, everybody ate goose. And so we had that morning, noon and night. We have some very interesting American breeds. The pilgrim is up there at the top. It's sexually dimorphic, which means it has two colors and different sexes. The American buff down at the right is a breed that was developed in this country. And then over there is a whole gaggle of different duck breeds. They work really well for slugs and snails and pond leeches. I'm really interested to see, one of the projects that I worked on in Hawaii, oh, they were using ducks to control African snail egg cases in the organic taro. They're bright pink and they're about this big. And you can walk around in the taro patches and pull them off by hand. But why do that when the ducks would be much happier to do it.

Here's the pilgrim goose, American gosh. These are Indian runner ducks. These are egg laying ducks. If you have access to an Asian market, duck eggs are gold. And they lay more than 300 eggs a year. They're great in ponds. You can herd them around. They're developed into this sort of bowling pin status because they were herded by the children out to the rice paddies every day and then brought into the compound at night to protect them from predators. So obviously, you want an efficient walker, not something like this one, who, where the legs are way back on the body. So these work really well, following up on some of the grazing animals.

This was one of the projects in Hawaii of the Permaculture Institute, where they were using ducks. And those little white things in the back were very light-weight tractors,

and they were pulling them through the pineapple patches to keep the grass down. And then, just in front of there, is a line of comfrey. And that was used as a slug and snail shelter. So in the heat of the day, the slugs would all go in there, and then the ducks would come along and eat them.

Well, we missed the Narragansett turkey, but I want to talk – oh, my time's almost up. I want to talk about turkeys because this is a project that has become very successful, with these Heritage breeds. This is the Narragansett. It's the first American breed of turkey that was developed back in the 1700s. Before 1950, farms all over the country raised a couple dozen turkeys for themselves and for their neighbors. We didn't really have a turkey industry. We're trying to find other jobs for many of these breeds. This is a job that didn't work out very well. And we always have to have a sex slide in to keep people's interest. This is my sex slide. It's artificial insemination of a turkey. And all the turkeys that go to your market are inseminated artificially. None of them reproduce naturally, which means that they are dependent on humans. Without human intervention, in one generation, they'd all be extinct. There are a lot of other things for which they are dependent. But I think reproductive dependence is a pretty serious issue.

And they live in confinement. What we have been trying to promote is free-range turkeys. This is not going to be the cheap turkey sliced wrap that you get at the airport. We've been promoting these as holiday birds, as celebratory feasts. And using grains and natural forage.

Here's the American bronze, which was almost our national bird, and the buff turkey. The royal palm turkey was developed as an ornamental turkey in Florida. But it's perfect for small holders. It's about a 12 pound turkey. And besides that, it's very beautiful.

So this is the end, but it reminds us that we have to be using these creatures. If they're not being used. If they're not being eaten, it will be the end. They'll be gone. And the genetics that they retain, the diversity that they have, will be unavailable to use for the future. Thank you.