

The NCSU Meat Goat Program and the Status of the Meat Goat Industry in North Carolina

Jean-Marie Luginbuhl
Professor &
Extension Meat Goat Specialist

Executive Summary

In July 1994, the NC general Assembly approved a budget that included \$200,000/year in recurring funds for the development of a meat goat program at NCSU. Following that appropriation, NCSU established in 1995 a faculty position with technical support staff and an operating budget in support of this fledgling industry. In late October 1995, Dr. Jean-Marie Luginbuhl was hired as an assistant Professor to lead the NCSU research and extension meat goat program.

As little research data were available from the region specifically directed toward forage feeding programs for goats reared for meat production, research projects were conducted with emphasis on sustainable systems for the creation of information essential to the profitable production of meat goats in North Carolina.

The South African Boer goat was very important to the development of the NCSU

meat goat breeding herd and NC meat goat industry. A portion of the NCSU Boer goat herd is now being backcrossed to Kiko bucks, a hardy meat breed originally from New Zealand.

The Meat Goat and Forage Educational Unit and the Small Ruminant Educational Unit have been used extensively for forage and forage-related research. From 1996 to 2014, 4,565 goats from the NCSU breeding herd have been used for research. In addition, these units are extensively used for demonstrations and outreach purposes.

The Meat Goat Research and Forage Educational Unit and the Small Ruminant Educational Unit are ideal field laboratories providing important hands-on experiences undergraduate and graduate students could not get otherwise. Since the start of the NCSU meat goat program, over 10,700 students were taught laboratories at these two facilities. Without a herd of goats and a flock of sheep, some

courses could no longer be taught, and introductory and other courses would be negatively impacted.

In cooperation with the North Carolina Department of Agriculture marketing specialist, a graded goat sale was implemented in Monroe (Union County) to supplement weekly auction market sales. Goats from various NCSU research experiments were used to correlate live grades with carcass grades.

As a result of Dr. Luginbuhl's leadership, the NCSU meat goat research and outreach program is recognized as the lead institution involved in forage evaluation and the development of forage systems for meat goats in the southeastern USA. Furthermore, the NCSU meat goat program is also well known at the international level as demonstrated by Dr. Luginbuhl's international involvement and responsibilities.

The increased interest in meat goat production and goat meat consumption in NC is also represented by several statistics:

- The number of goats processed in North Carolina has been increasing steadily since the mid-nineties. The number of goats processed increased from 534 in 1994 to a yearly average of 23,605 for the last 4 years.
- The NC meat goat breeding stock inventory has ranged over the years from over 43,000 to over 100,000 head. The present breeding stock inventory is estimated to represent a capital of over \$12 million spread over 3,659 farms, or an average of 15 goats per farm.

- 52 goats were entered in the Goat Show at the NC State Fair in 1996 but from 2008 to 2014, these numbers have hovered steadily over 600 head. In addition, the number of exhibitors in the Junior Market Goat Show numbered 31 in 1997 but increased to a yearly average of 311 exhibitors for the last 10 years.
- Interest in dairy goats has also been increasing as the number of dairy goats shown at the NC State Fair during the last 6 years has ranged from 791 to 1502, with an average of 118 exhibitors.
- In 1995, only 3 certified goat dairies existed in North Carolina, whereas that number has increased to 27 by 2015. An additional number of dairy goat farms specialize in the manufacture of soaps, lotion and creams from goat milk.

Recommendations for the Future

The NCSU meat goat program continues to play an important role supporting the development of the meat goat industry and benefits a large segment of our rural and semi-rural population, many of them resource-limited and/or part-time producers. Nevertheless, as the NC dairy goat, sheep and camelid industries are growing and due to the fact that those industries' producer needs are unmet, the future program should be renamed and include meat goats, dairy goats, sheep and camelids. In addition, the position should contain a preponderant responsibility in outreach and the rest assigned to research, the latter leaning heavily toward forage/browse utilization, grazing and feeding strategies, and multi-species grazing.

The NCSU Meat Goat Program

Interest in meat goat production in North Carolina has increased during the past 25 years because of the increased demand for goat meat. This increase in demand is linked to a growing segment of the population of North Carolina and the Eastern USA which represents ethnic groups who prefer goat meat in their diet.

In July 1994, the NC general Assembly approved a budget that included \$200,000/year in recurring funds for the development of a meat goat program at NCSU. Following that appropriation, NCSU established in 1995 a faculty position with technical support staff and an operating budget in support of this fledgling industry. In late October 1995, Dr. Jean-Marie Luginbuhl was hired as an Assistant professor to lead the NCSU research and extension Meat Goat Program. The position is shared between the Departments of Crop Science and Animal Science (50:50). His office is located in William Hall and his laboratory in Polk Hall.

When Dr. Luginbuhl was hired, there were several job expectations: 1) he was to develop a meat goat extension program that would serve the county extension faculty, meat goat producers, the meat goat industry, and the public at large, 2) he was to develop a research program that would support the extension program, with emphasis on the development of sustainable systems for the creation of information essential for producers and the profitable production of meat goats in North Carolina.

Research

At the time of Dr. Luginbuhl's hire, little research data were available from the region specifically directed toward forage feeding programs for goats reared for meat

production. Therefore, to support this emerging industry, research was initiated with emphasis on sustainable systems for the creation of information essential to the profitable production of meat goats in North Carolina.

- The potential of cool-season and warm-season perennial and annual forages to meet the nutritional requirements of productive does throughout the different stages of their production cycle and of growing kids and replacement does.
- The effects of adding clovers to tall fescue pastures on the nitrogen status of goats, forages and soils.
- The potential of woody trees and shrub species adapted to our environmental conditions and suitable for meat goats as protein and/or energy banks during the summer.
- The tolerance of meat goats to copper, a micro-mineral affecting growth and the immune system, was investigated.
- Byproduct feeds, such as cottonseed, wheat-middling, corn-gluten feed and soybean hulls were tested with goats fed forage-based diets.
- The effect of gossypol, a yellow pigment found in whole cottonseed that may affect male reproductive function, was examined in collaboration with Virginia State University.
- Research conducted in collaboration with scientists from the NCSU College of Veterinary Medicine, Virginia Tech and the American Consortium for Small Ruminant Parasite Control (www.acsrpc.org) explored non-

pharmaceutical approaches to treating goats against gastrointestinal parasites using herbal dewormers, copper oxide needle boluses and plant-containing tannins such as the summer legume sericea lespedeza.

- The determination of the effect of synchronization of does early in the breeding season on ovulation and pregnancy rates, and fecundity.
- Research conducted at the NCDA&CS Mountain Research Station in Waynesville in an abandoned orchard, and in southwest Virginia on reclaimed mine land in collaboration with scientists from Virginia Tech, demonstrated that goats have significant economic value in biological control of weeds and brush in land reclamation projects.
- A two-year study/demonstration conducted on the grounds of the NCSU Centennial Campus demonstrated that goats not only thrive on kudzu but, most importantly, can be used to eliminate kudzu entirely by putting into practice our present knowledge of the browsing behavior of these animals.

These projects were conducted in collaboration with personnel from the departments of Animal Science, Farm Animal Health and Resource Management, Agricultural and Resource Economics, Horticulture, as well as from NC A&T and the North Carolina Department of Agriculture and Consumer Services research stations and marketing specialists. Regional collaborators include

faculty from Virginia State University, Virginia Polytechnic Institute and State University, Fort Valley State University, Langston University, Louisiana State University and Tennessee State University.

Goat Genetics, Size and Use of the NCSU Research & Breeding Herd

The South African Boer goat was very important to the development of the NCSU meat goat research herd and NC meat goat industry. In April of 1993, Boer genetics were released from quarantine in New Zealand and were offered for sale in North America (mainly as frozen embryos). Fortunately, NC State University and a few key producers were able to obtain some of these embryos to form the core for a research herd and to provide a sound genetic base for the improvement of meat goat genetics in the state. Following several years of speculative prices, Boer goat breeding stock prices became affordable to smaller producers. A portion of the NCSU Boer goat herd is now being backcrossed to Kiko bucks, a hardy meat breed originally from New Zealand, either through natural mating or artificial insemination. Purebred Boer and crossbred animals having Boer and/or Kiko genetics are now being sold for meat at auction markets or under private sales and buyers and consumers already have recognized the superior carcasses of those animals.

The NCSU meat goat program breeding herd is located at the Reedy Creek Rd Field laboratory (RCRFL) Small Ruminant Educational Unit (SREU) on Trenton Rd and is presently composed of the following:

- Bred does 100
- Yearling does 30
- Bucks
 - breeding 5
 - vasectomized 3
- Average yearly kid crop 180

All the animals used for Dr. Luginbuhl's research program conducted over the

years at RCRFL originated from the NCSU breeding herd (**Tables 1 and 2**).

Table 1. Total no. of goats used for grazing research by the meat goat program

Year	Kids	Yearlings	Does	Total no. animals used
2014	140		185	225
2013	137		127	264
2012	108	65	150	323
2011			167	167
2010	132		82	214
2009	150	26	97	273
2008	182	12	22	216
2007	97	72	30	199
2006	220	0	116	336
2005	147	25	76	248
2004	195	20	85	300
2003	0	0	55	55
2002	0	90	60	150
2001	94	63	160	317
2000	69	153	40	262
1999	0	45	40	85
1998	45	83	0	128
1997	45	48	0	93
Total	1761	702	1312	3775

Table 2. Total no. of goats used for research at the metabolism unit and SREU¹

Year	Kids& wethers	Does	Total no. animals used
2008	26	18	44
2007	18	30	48
2006	16	30	46
2005	48	8	56
2004	86		86
2003	136		136
2002	106	8	114
2001	34	16	50
2000	78	8	86
1999	40		40
1998	24		24
1997	24		24
1996	36		36
Total	672	118	790

¹No research was conducted at the Metabolism Unit after 2008 due to a change in emphasis of the NCSU meat goat research program.

Outreach

To support the emerging NC meat goat industry, educational programs targeting CES agents, commodity associations and other agricultural professionals were implemented with the objective that meat goat producers will select, adopt and successfully implement best management practices that will achieve business, individual, and family goals related to profitability and quality of life. Extension publications and PowerPoint presentations continue to play a crucial role as educational and technology transfer materials of Dr. Luginbuhl outreach program. In addition, an extension meat goat portal (<http://meatgoats.ces.ncsu.edu>) was developed to provide quality and timely information to CES agents and producers.

The Meat Goat and Forage Educational Unit and SREU have been used extensively for forage and forage-related research, control grazing demonstrations, in-service training of Cooperative Extension Agents, NRCS personnel, grazer schools and field days, and Civil Medics and Civil Affairs Brigade and Battalion personnel from Fort Bragg and Camp Lejeune. These activities increased substantially because livestock agents have had little or no training in the areas of forages, forage management, fencing to contain goats, meat goat nutrition, health, production and management.

In cooperation with the North Carolina Department of Agriculture marketing specialist, a graded goat sale was

implemented in Monroe (Union County) to supplement weekly auction market sales. Goats from various NCSU research experiments were used to correlate live grades with carcass grades.

In a joint effort between the NCSU Meat Goat program and the Franklin County Cooperative Extension Service livestock agent, the NC Meat Goat Producers Inc. was created in June 2001 to direct market high quality live goats or goat meat directly to consumers and area retail stores and restaurants, thus bypassing middlemen and establishing a direct link from producers to consumers, or “from pasture to plate”. Interested producers had to attend a quality Assurance Certification Program to become members. Over 15 Quality Assurance Certification courses were delivered from 2001 through 2006. Thanks to grants from the Goldenleaf Foundation, the NC Meat Goat producers Inc. made great strides, and elicited much interest from NC meat goat producers. The association, initially composed of a membership of approximately 40 members, totaled over 720 certified farm families from 65 counties and 4 states by 2006. Goat pick-up stations were located in Louisburg (Franklin Cty), Lumberton (Robeson Cty), Shelby (Cleveland Cty), Snow Camp (Alamance Cty), West Jefferson (Ashe Cty) and Yadkinville (Yadkin Cty), thanks to Tobacco Trust Fund grants awarded through RAFI International located in Pittsboro, NC, and other funds. Unfortunately, this association lost momentum once grant dollars run out.

The demand by producers and want-to-be producers for statewide workshops and conferences increased rapidly. In 2005 and 2007, 2009 and 2011 in collaboration with a core group of dedicated CES agents, “The Goat and Sheep Roundup I, II, III and

IV” two-day conference for goat and sheep producers, were attended by a range of 150 to 135 producers. As an innovative marketing tool, chefs from area upscale restaurants were contacted and invited to participate in a goat cook-off. Each chef received a half goat carcass as a promotion. Chefs participating in the cook-off brought main dishes that were first evaluated and ranked according to several criteria, the winner receiving a plaque. These goat dishes provided lunch for workshop attendees.

The American Consortium for Small Ruminant Parasite Control has commended the NCSU meat goat program for the rapid implementation of a state-wide integrated gastrointestinal parasite control program, the only state doing so in the southeast. From 2007 to 2014, Dr. Luginbuhl trained and certified over 400 producers, all CES livestock agents with the exception of recent hires, NCSU staff, veterinary technicians, NCSU faculty and staff, and 52 students from ANS 408 Small Ruminant Production and Wayne Community College. Certified CES agents are now training and certifying local producers in their own counties. In addition, Dr. Luginbuhl was invited to train producers and veterinarians attending national conferences such as the American Dairy Goat Association, The American Livestock Breed Conservancy and the Southeastern Animal Fiber Fair. Many additional producers and veterinarians were trained but did not undergo the certification. Feedback from agents and producers indicate that implementation of the program tools help them control gastrointestinal parasites more effectively, decrease their health program costs, and allow them to make better culling decisions. Research conducted at NCSU demonstrating that gastrointestinal parasites fecal egg counts

are reduced when goats are grazing sericea lespedeza (a warm-season perennial legume) has led to a large increase in the acreage of that forage in the southeastern United States.

In summary, the NCSU meat goat research and outreach program benefits a large segment of our rural and semi-rural population, many of them resource-limited and/or part-time producers.

Impacts

As a result of Dr. Luginbuhl's leadership, the NCSU meat goat research and outreach program is recognized as the lead institution involved in forage evaluation and the development of forage systems for meat goats in the southeastern USA, resulting in numerous out of state invitations for speaking engagements and requests to use the educational materials he published. In addition, as a result of the last two research projects mentioned earlier, local, regional and national media have featured goats controlling woody and noxious vegetation, such as in the perimeter of the San Francisco airport, the Biltmore Estate in Asheville, water reservoirs, historic sites, backyards, etc. and some NC companies are now providing these services. Goats can also be observed browsing and grazing in the Oakland and Berkeley hills of California to reduce brush and prevent the incidence of forest fires around urban areas. Finally, using goats as natural biological controls for many undesirable species of weeds, thus reducing or eliminating the need for herbicide spraying is very attractive to organic and natural farmers, as well as to traditional farmers.

The NCSU meat goat program is also well known at the international level as demonstrated by Dr. Luginbuhl's

international responsibilities as member of the Board of Directors and Secretary-Treasurer of the International Goat Association, and his past responsibility as Associate Editor of the Agrosilvopastoral and Forage Systems sections of the international journal Small Ruminant Research. In addition, Dr. Luginbuhl participated as Co-Pi of two international projects in Latin America, served as external examiner for several PhD theses final examinations (Costa Rica, France, Sweden), and made invited presentations at many international conferences. In 2014, Dr. Luginbuhl was invited to make two presentations at the China Sheep and Goat Production and Scientific Conference in Liaocheng, Shandong, China and at the 'Expo Nacional de la Cabra, el Queso y la Cajeta and the X International Goat Symposium' in Celaya, Queretaro, Mexico. Finally, Dr. Luginbuhl has been invited to write a manuscript and make an oral presentation 'Sustainable Meat Goat Production: Grazing Strategies and Forage Utilization' at the XXIV Congress of the Latin American Association of Animal Production, to be held November 2015 in Chile.

Teaching

The Meat Goat Research and Forage Educational Unit and the Small Ruminant Educational Unit (SREU) are ideal field laboratories providing important hands-on experiences undergraduate and graduate students (both CS and ANS) could not get otherwise. Teaching students how to sustainably manage goats and sheep serves to prepare our future farmers, veterinarians, and extension agents. Many ANS undergraduates are pre-vet, and the students from the College of Veterinary Medicine also benefit from experiences gained at the Meat Goat and Forage Educational Unit and the SREU. In

addition, an increasing number of students are very interested in sustainable agriculture and small herds of goats and flocks of sheep work out very well in these systems. Maintaining both sheep and goats allows professors to have students compare and contrast the two species as they learn about similarities and differences. It is important to have an intact flock of sheep and herd of goats for the behavioral, management, and reproductive observations in the pastures, and this experience could not be replicated by bringing in a few animals at a time for specific labs. Students are able to learn about natural breeding and artificial insemination, kidding/lambing, processing of newborn animals, managing a farm, health and feeding management, animal behavior and biosecurity. Sheep and goats are small, non-intimidating animals providing an introduction to livestock for people with no prior livestock experience, which means this unit is a very important part of undergraduate introductory courses. Finally, faculty have supervised students participating in undergraduate research (grazing studies, sheep/goat reproduction) at the Meat Goats and Forage Educational unit and SREU.

The sheep flock, used for teaching purposes, is presently composed of:

- Breeding ewes 60
- Yearlings 15
- Rams 4

Since 1995, laboratories from courses such as CS 151 (Forage Production), CS 312 (Grassland Management for Natural Resource Conservation), CS 430 (Advanced Agroecology), ANS 020 (Intro to Livestock and Poultry), ANS 150 (Intro to Animal Science), ANS 201 (Techniques of Animal Care), ANS 221 (Reproduction and Lactation), ANS 309 (Livestock Evaluation), ANS 408 (Small Ruminant

Management), ANS 531 (Advanced Applied Animal Reproduction Lab), STS 323 Q (Global Sustainable Human Development), VMP 956 (Health Maintenance and Animal Production III), VMP 970 (Ruminant Health Management I), VMP 972 (Ruminant Health Management II), VMP 974 (Food Supply Veterinary Medicine), VMP 992-V (Small Ruminant Clinical Experience), and ANS 111 (Sustainable Livestock management) from the Central Carolina Community College, have used the Meat Goat Research/Forage and Educational Unit and the SREU for teaching laboratories. Additionally, the Student Chapter of the American Association of Small Ruminant Practitioners has scheduled "web labs" at the SREU, and the facilities and its animals have been used for Club Day (Academic quadrathlon), 4-H Skillitons, 4-H livestock group tours, Vet Camps, and 4-H Judging Contests trainings.

Impacts

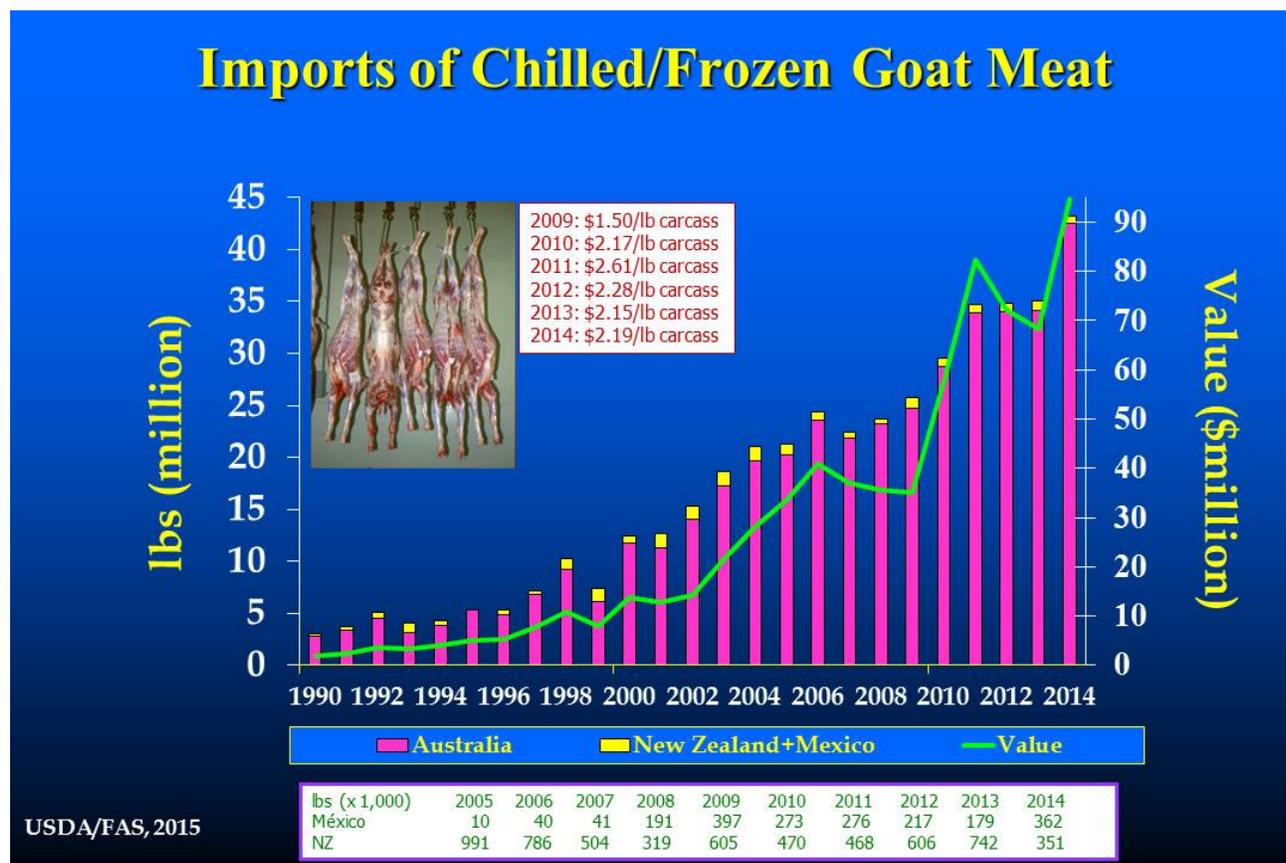
We estimate that since the start of the NCSU meat goat program, over 10,700 students were taught laboratories at these two facilities. Without a herd of goats and a flock of sheep, some courses could no longer be taught, and introductory and other courses would be negatively impacted.

Industry Size and Value

Interest in meat goat production in North Carolina has increased during the past 25 years because of the increased demand for goat meat. This increase in demand is linked to a growing segment of the population of North Carolina and the Eastern USA which represents ethnic groups who prefer goat meat in their diet. US census data indicate that more than 700,000 immigrants who prefer goat meat to other meats enter the USA each year. In

North Carolina, the Hispanic population is estimated at over one million (legal + illegal immigrants), representing approximately 12% of the general NC population out of a countrywide population of 53 million (US Census Bureau, 2013). Significant number of people of African, Asian, Middle-Eastern and Caribbean origin also resides in North Carolina. Although the current market picture is disjointed and confusing, there is an unfilled demand for goat meat in the major cities of the United States, and especially in the population centers of the Eastern seaboard. North Carolina's geographical proximity to these large urban markets is a real advantage.

Since 1991, the United States is a net importer of goat meat (**Graph 1**). In 2014, 43,188 million pounds of goat meat were imported for a total value of \$94.7 million, respectively, compared to 2,994 million pounds in 1990 for a total value of \$1.9 million. The price per pound of imported carcass increased dramatically from \$1.50 in 2009 to \$2.17 in 2010 and peaked at \$2.61 in 2011, then decreased to \$2.28, \$2.15 and \$2.19, respectively, during the last 3 years. With the exception of 5 years, over 90% of the carcasses were imported from Australia. That trend has ranged from 96.1 to 98.3% during the last 9 years.



In North Carolina, most goats are sold at the Powell Livestock – Smithfield Goat Auction (1st and 3rd Wed of every month - <http://www.ncagr.gov/markets/mktnews/RA>

[LS550.TXT](#)) and the Union County Livestock Market – Monroe Graded Goat Sale (1st Wed of every month - <http://www.ncagr.gov/markets/mktnews/RA>

[LS552.TXT](#)). The price of imported carcasses (**Graph 1**) directly influences local prices that are very competitive compared to other commodity prices.

As mentioned, the demand for goat meat is ethnic based. Nevertheless, there is an emerging demand for goat meat as a gourmet item. Some producers and savvy entrepreneurs market goat meat directly to

consumers and upscale restaurants, and are getting a price premium for their products (**Table 3**), compared to retail prices at the processing plant. In addition, health concerns regarding red meat do not apply to goat meat, which is similar to other meat in terms of protein, but is lower in calories, cholesterol, and total and saturated fat (**Table 4**).

Table 3. Price of goat cuts direct marketed to farmers' markets and some restaurants in the Triangle area of NC vs retail prices at processing plant

Cut	Prix/lb US\$ Direct marketed	Prix/lb US\$ Retail at plant
Loin	15.00	7.59
Leg	15.00	7.59
Shoulder/Shank	12.50	7.59
Ribs	12.50	8.39
Sausage	18.00	
Ground	12.75	8.10
Stew	12.50	8.29
Boneless mix		7.99

Table 4. Goat Meat Comparative Chart USDA Nutrient Database for Standard Reference - Release 14 (July 2001)

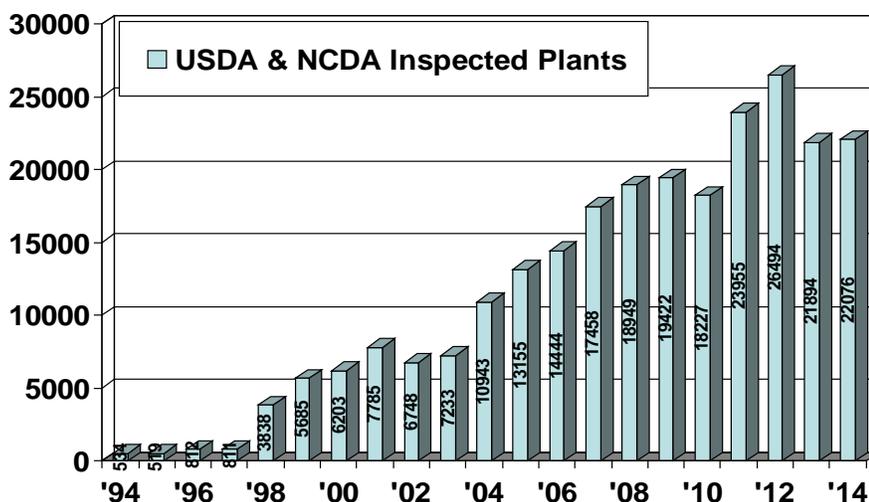
Item	Goat ^a	Chicken ^b	Beef ^c	Pork ^d	Lamb ^e
Calories, kcal	122	162	179	180	175
Total fat, g	2.6	6.3	7.9	8.2	8.1
Saturated Fat, g	0.79	1.7	3	2.9	2.9
Protein, g	23	25	25	25	24
Cholesterol, mg	63.8	76	73.1	73.1	78.2

^aGame meat, goat, cooked roasted; ^bChicken, broilers or fryers, meat only, trimmed; ^cBeef, composite of trimmed retail cuts, separable lean only, trimmed to 0" fat, all grades, cooked; ^dPork, fresh, composite of trimmed retail cuts (leg, loin and shoulder), separable lean only, cooked; ^eLamb, domestic, composite of trimmed retail cuts, separable lean only, trimmed to ¼" fat, choice, cooked.

The increased interest in meat goat production and goat meat consumption is also represented by the number of goats harvested in NCDA- and USDA-inspected plants in North Carolina (**Graph 2**). The number of goats processed in North Carolina has been increasing steadily since the late nineties with 2011 and 2012 being the peak years at 23,955 and 26,494 head, respectively. According to the North Carolina

Department of Agriculture & Consumer Services statistics, the NC meat goat breeding stock inventory has ranged over the years from over 43,000 to over 100,000 head. The present breeding stock inventory is estimated to represent a capital of over \$12 million spread over 3,659 farms, or an average of 15 goats per farm. These statistics, however, are on the low side as many NC producers do not want to declare the number of goats in their possession.

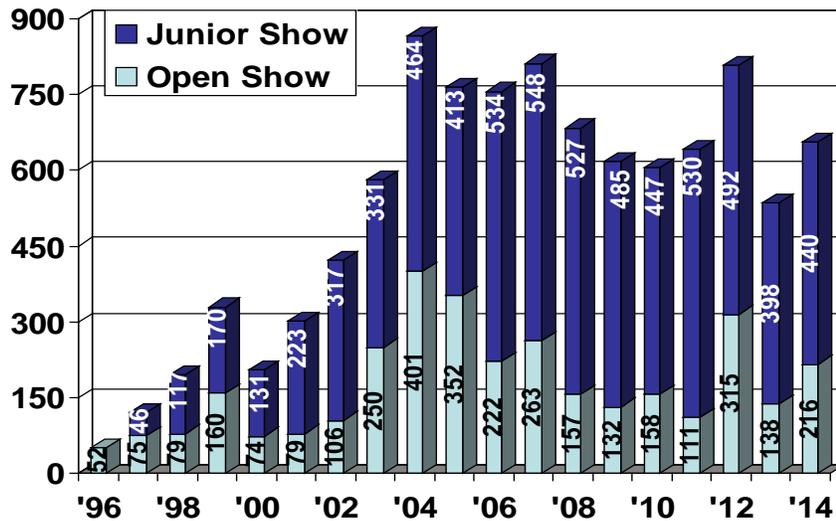
Graph 2. Goats Harvested in North Carolina



Another indicator of the expansion of the meat goat industry is the fact that goat shows were successfully implemented at the Mountain and North Carolina State Fairs in 1996. Interest grew rapidly: 52 goats were entered in the Goat Show at the NC State Fair in 1996 versus 121 in 1997, 196 in 1998, 330 in 1999, 433 in 2002 and 581 in 2003 (**Graph 3**). As of 2014, the highest number of meat goats showed at the NC State Fair was 865 head in 2004,

811 in 2007, 807 in 2012, 765 in 2005 and 756 in 2006. During 2008-2014, these numbers have hovered steadily over 600 head, with the exception of 2013. The number of goats entered in the Junior Market Goat Show far outnumbers those entered in the Open Show, although a 183% increase in the number of goats entered in the Open Show was observed between 2011 and 2012.

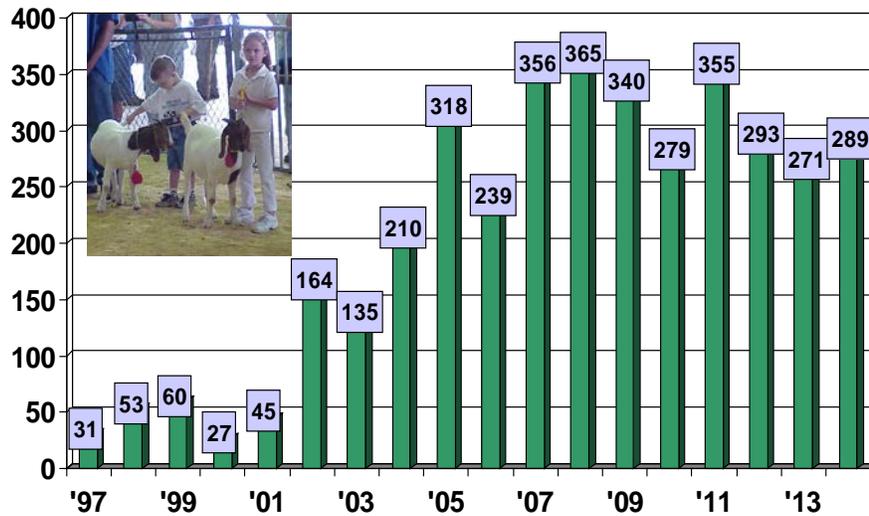
Graph 3. No. Meat Goats Entered at NC State Fair



In addition, the number of exhibitors in the Junior Market Goat Show (**Graph 4**) jumped from 31 in 1997 to 53 in 1998 and to 60 in 1999. More recently, the number of exhibitors in the Junior Market Meat Goat Show increased to 164, 135, 210, 318, 239, 356, 365, 340, 279, 355, 293, 271 and 289 from 2002 through 2014, respectively, showing some fluctuations between years. These statistics clearly indicate the increased interest in meat goats by young people. The lower number of exhibitors in

the Junior Market Goat Show (27) and the lower number of goats entered in the NC State Fair in 2000 (205) was due to the unawareness of many producers and exhibitors of new Fair regulations concerning tuberculosis and brucellosis. Non-compliance with these new regulations resulted in the withdrawal of many goats from the Show. Finally, during the last 4 years an average of 4,684 youth were enrolled in the 4-H meat goat project statewide.

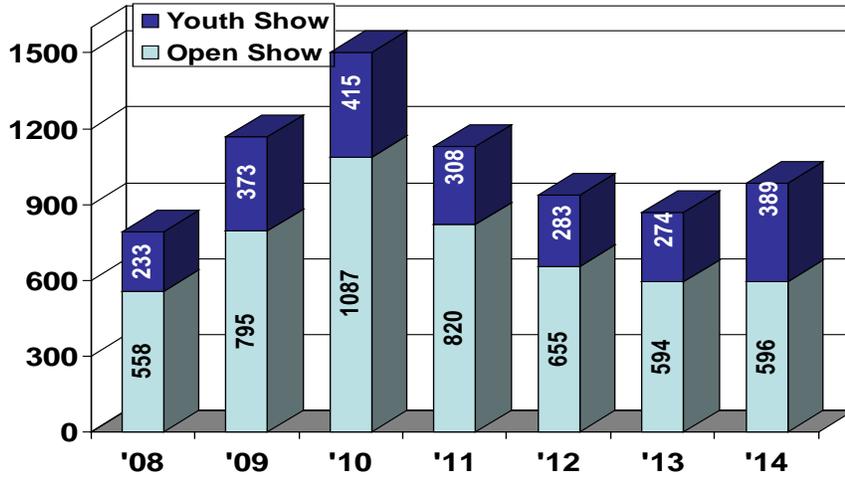
Graph 4. No. Junior Meat Goat Show Exhibitors – NC State Fair



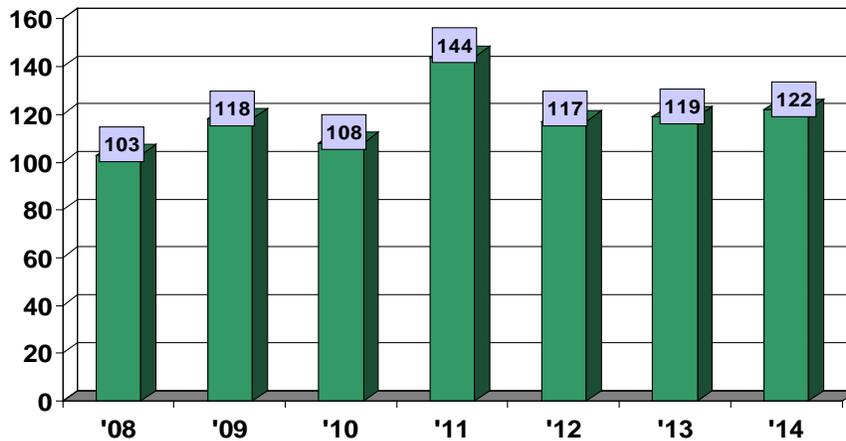
Interest in dairy goats has also been increasing (**Graphs 5 & 6**). The number of dairy goats shown at the NC State Fair during the last 6 years has ranged from 791 to 1502, with an average of 118 exhibitors. Furthermore, in 1995 only 3

certified goat dairies existed in North Carolina, whereas that number has increased to 27 by 2015 (**Graph 7**). An additional and substantial number of dairy goat farms specialize in the manufacture of soaps, lotions and creams from goat milk.

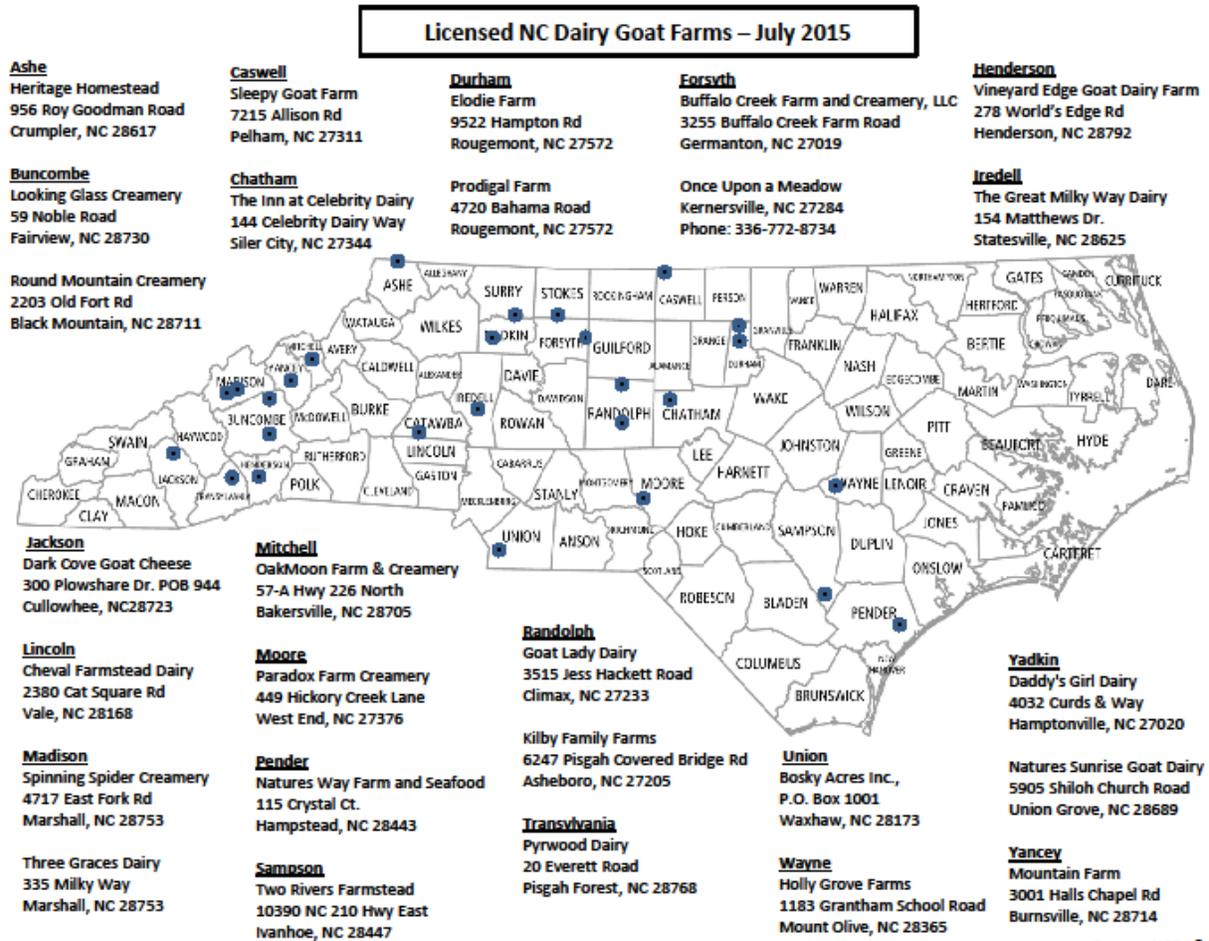
Graph 5. No. Dairy Goats Entered at NC State Fair



Graph 6. Dairy Goat Show Exhibitors – NC State Fair



Graph 7. Licensed NC Dairy Goat Farms



The foundation of a meat goat industry in North Carolina depends on the existing natural resource base. North Carolina possesses the land, water, and the forage and shrub base to play a pivotal role in the expansion of the national meat goat herd. Twenty-five million acres, divided into grassland pasture, cropland used only for pasture, idle cropland, cropland used for crops, and forest land, are available. In addition, it is estimated that most beef cattle farmers would have enough "excess" feed in cattle pastures to feed 1-2 goats per cow at no additional cost. There are more than 500,000 beef cows in North Carolina, suggesting that beef pastures could

support between a half and one million goats. The complementary effects of grazing cattle and goats on the same farm provide an opportunity to enhance and augment North Carolina existing beef cattle industry by improving pasture condition and feed quality. Finally, North Carolina farmers are searching for new sources of farm income and for ways to diversify their operations, and develop sound and cost effective environmental practices to stay competitive in a global economy. Goat farming seems to be independent of scale. Small, part-time farmers with only a few acres can raise enough animals to provide an income supplement. Conversely, very

large farms can efficiently integrate a meat goat enterprise to aid in diversification of

the farm.

***R*ecommendations for the future**

The NCSU meat goat program continues to play an important role supporting the development of the meat goat industry. As the NC dairy goat, sheep and camelid industries are growing and due to the fact that those industries' producer needs are unmet, the future program should be renamed and include

meat goats, dairy goats, sheep and camelids. In addition, the position should contain a preponderant responsibility in outreach and the rest assigned to research, the latter leaning heavily toward forage/browse utilization, grazing and feeding strategies, and multi-species grazing.

Funding Sources obtained in support of the meat goat program

GoldenLeaf Foundation
Grass Roots Foundation
NCARS
NCCES
NCSU Goodness Grows
Initiative for Future Agriculture
and Food Systems
Tobacco Communities
Reinvestment Fund
USDA
USDA NRCS
USDA SARE
Z-Smith Reynolds Foundation

Prepared by:
Jean-Marie Luginbuhl
Professor
Meat Goats & Forage Systems
Campus Box 7620
North Carolina State University
Raleigh NC 27695-7620
Tel: 919-515-8743
Email: jmlugin@ncsu.edu
<http://meatgoats.ces.ncsu.edu>

August 25, 2015

Appendix I

History Leading up to the Development of the NCSU Meat Goat Program

1987-1989

- Drs. Jim Green and Paul Mueller from the Department of Crop Science acquired Brush goats (see picture below) primarily for the purpose of evaluating the potential for goats in brush control in cattle pastures, and for renovating overgrown land. Goats were housed at The Reedy Creek Road Field Laboratory (RCRFL) on the Forage/Grazing Ruminant Demonstration Unit and were from surplus animals owned by the University as well as donated from a local farmer. Funding (\$1,000) was obtained from the North Carolina Forage and Grassland Council to obtain Angora goats from Texas to evaluate their potential for use in a meat/fiber/brush control program.
- Brush goats were acquired at the North Carolina Department of Agriculture & Consumer Services Mountain Research Station in Waynesville by Drs. Jim Green and Paul Mueller for the purpose of renovating overgrown land on the station. Initial renovation was initiated on several areas of the farm.
- An overgrown apple orchard at the Mountain Research Station was chosen as a site for a controlled study on the use of goats with or without cattle on the renovation of such sites. This site contained about 60 large multiflora rose plants, and the control of each individual plant was documented. The initial plan was developed by Drs. Jim Green, and Matt Poore and Kevin Pond from Animal Science. Subsequent animals of Spanish and native “brush” goats were obtained to provide the numbers necessary for this trial. The project (initiated in spring of 1991) was conducted by Dr. Jim Green and Matt Poore. An extension agent/graduate student summarized the results of this project. Two grants totaling \$7,000 had been obtained for this specific trial (Small and Part-time Farmers Program IPM program).



1990

- A trial was initiated at RCRFL to evaluate the best approach of using overgrown areas. The study evaluated imposing brush control vs. rotational browse production on a “waste” area of the Laboratory. This trial was to continue for 3 years. Three graduate students have been involved in this project, one of which received an MA for which this project was the focal point.
- Initial discussions with the U.S. Forest Service led to a large project in which goats were being used to control unwanted brush on Roan Mountain, one of the natural mountain “balds” in North Western North Carolina.

1992

- On March 24, the North Carolina Meat Goat Conference was conducted in Greensboro at North Carolina A&T State University. This conference was planned and conducted by Drs. Jim Green, Paul Mueller, Matt Poore, Matt Claeys (Animal Science) and Ray McKinnie (NC A&T). The conference was attended by 100 producers and agriculture agents from North Carolina, South Carolina and Virginia. Drs. Green, Mueller and Poore were on the program, and the program also included goat specialists from Florida, Alabama, South Carolina and Virginia.
- After this conference, the planning committee was approached by Sharon Valentine, President of an agricultural venture capital group called AgriVentures, Inc. She said she had an interest in meat goats as an entrepreneur with rural economic development in mind. She indicated to us that she was putting together a grant proposal for studying the potential of a meat goat industry.

1993

- A grant funded for \$50,000 by the Mid-Carolina Council of Governments, \$5,000 of which went to Drs. Green, Mueller and Poore to support educational efforts in meat goats. The grant included a market development study, and called for the development of an association of meat goat producers and a series of educational events that would inform them about marketing and market development, selecting breeding stock, nutrition, forage production and animal health. Drs. Green, Mueller and Poore worked closely with the first co-executive officers of the association, Sharon Valentine and Albert Calloway, to help create the association by-laws and develop the educational events.

- In October of 1993, the South Eastern Regional Meat Goat Association (SERMGA) was formed at a meeting in Raleigh of 80 charter members and 30 others. Drs. Green, Mueller and Poore were appointed as ex-officio advisors to the board of directors. Due to the lack of a formal "Meat Goat Program", the association initiated discussion on how to develop support in the legislature for a "Meat Goat Program" at NCSU. A strategy was developed and carried out by the board. A proposal for a program was developed by Drs. Green, Mueller and Poore and submitted to the NCSU administration for inclusion in a change budget request.

- In fall of 1993, The Boer goat breed was released from quarantine for export from New Zealand for importation to the U.S. This is the premier meat goat breed in the world. Funding was obtained from the North Carolina Agriculture Research Service and the North Carolina Cooperative Extension Service to purchase embryos and to have them implanted into "brush goats".

1994

- In March, 28 Boer goat kids were born at RCRFL (see picture below). As a result, 10 Boer goats were obtained by NCSU. Dr. Bill Johnson requested colostrum samples from the recipients and also requested samples from recipients owned by Sharon Valentine at Fayetteville. Dr. Ben McDaniel became involved in the Boer Goat project in the role of providing advice concerning the breeding program for these animals.
- The North Carolina Meat Goat Handbook was developed and distributed to all counties. Eight grants

totaling \$26,000 were obtained to support these activities, although a substantial amount of funding had been diverted from other projects.



- **In July, the state legislature approved a budget that included \$200,000/year in recurring funds for the development of a Meat Goat Program at NCSU.**

1995

- In late October, Dr. Jean-Marie Luginbuhl was hired as an Assistant professor in Crop Science and Animal Science (50:50) to lead the NCSU research and extension Meat Goat program. His office is located in Williams Hall and his laboratory in Polk Hall.