



AGRICULTURAL ALTERNATIVES

Dairy Goat Production

Dairy goat production is an alternative livestock enterprise suitable for many small-scale or part-time livestock operations. Some dairy goat producers have been successful in pasteurizing goat milk and building an on-farm jugging business, while others have ventured into processed milk products for retail distribution, especially specialty cheeses, yogurt, soap, and lotions. The potential also exists for selling milk to processors, usually on a regional basis. Although fluid milk and processed products are important markets, dairy goat producers should also consider the potential for selling animals to hobbyists and youth involved in vocational agriculture dairy projects.

In much of the developing world, goat milk is the primary milk source for humans. Goat milk is often sought for its perceived health benefits and unique taste. Although many health effects have been attributed to consuming goat milk, scientific evidence does not support most health claims. Goat milk is similar in composition to cow milk (Table 1), but some important differences exist in the protein structure. Because of these differences, people who have allergies to cow milk can often drink goat milk, and the smaller fat globules in goat milk stay in suspension longer, which leads to the perception of “natural homogenization.” Goats are excellent browsers, which allows them to consume plants containing aromatic or flavor compounds that can impart the smell or flavor to the milk or cheese, thus providing an opportunity to generate unique specialty products.

Marketing

The main marketing issue for prospective dairy goat producers is market entry for their product. There are few commercial processors to whom raw goat milk can be shipped, so many dairy goat producers build on-farm processing



USDA

Table 1. Comparison of average milk composition.

Nutrient	Human	Cow	Goat
Energy (kcal/100 ml)	68.00	69.00	70.00
Lactose (%)	7.30	4.70	4.10
Protein (%)	1.10	3.50	3.20
Fat (%)	4.00	3.60	3.80
Cholesterol (mg/100 ml)	20.00	15.00	12.00
Ash (%)	0.20	0.70	0.80
Calcium (%)	0.04	0.18	0.19
Phosphorus (%)	0.06	0.23	0.27
Iron (%)	0.20	0.06	0.07
Vitamin A (IU/g fat)	32.00	21.0	39.00
Vitamin D (IU/g fat)	0.30	0.70	0.70
Vitamin C (mg/100 ml)	3.00	2.00	2.00
Thiamin (µg/100 ml)	17.00	45.00	68.00
Riboflavin (µg/100 ml)	26.00	159.00	210.00

Data from <https://adga.org/>.

Abbreviations: kcal/100 ml is a measure of energy content; 1 kcal = 1,000 calories; IU = international unit, a measure of vitamin potency; µg = microgram, 1/1,000 milligram.

plants to produce products such as pasteurized bottled milk, yogurt, ice cream, cheese, and kefir. Selling processed products directly on the farm or in the store does require additional management and marketing skills; however, profit margins tend to be higher per unit sold compared to selling to a commercial processor. It is against the law in most states, including Pennsylvania, to sell raw milk or raw milk products unless it has been inspected by state milk inspectors. Some alternative uses for goat milk include creating health care products such as soap and lotion or as an on-farm substitute for milk replacer in lamb, veal, and pig diets. To use goat milk as an alternative feed source requires the dairy goat producer to buy and market lambs, veal calves, or piglets. Experience in managing and marketing these other livestock is also required, but it allows for the use of goat milk without state inspection.

Dairy goat producers must also realize that income from the kid goat crop is important. In addition to marketing the milk, the producer must also have a kid goat marketing strategy. It may be beneficial to raise kid goats to different market weights for different market seasons. Many ethnic groups are interested in purchasing kid goats, but producers must be aware of the desired weights and times when demand is greatest in such markets (see <http://www.sheepgoatmarketing.info/calendar.php>). For more information on raising meat goats, see “Agricultural Alternatives: Meat Goat Production” at <https://extension.psu.edu/meat-goat-production>.

Production

The eight major dairy goat breeds in the United States are the Saanen, Sable, Nubian, Toggenburg, LaMancha, Oberhasli, Nigerian Dwarf, and Alpine. The lactation period for dairy goats averages 284 days, with peak production usually occurring four to six weeks after kidding. Representative production data for the various goat dairy breeds can be found in Table 2. Volume and composition of milk produced are primarily controlled by the goat’s genetics, but they are also greatly influenced by the diet consumed.

Dairy goats reach sexual maturity at four to five months of age. Young does should be bred at a body weight rang-

ing from 70 to 80 pounds, which is usually at an age of seven to 10 months. The gestation period ranges from 145 to 155 days with an average length of 149 days. Does normally produce between one and three kids per year (single-born kids weigh approximately 6 to 6.5 pounds at birth). Birth weights generally decline with multiple births and are often associated with increased mortality. Quality of nutrition during pregnancy influences birth weight and kid survivability. Pregnancy nutrition becomes an important part of good management as twin births are desired in an effort to improve productive efficiency. Does giving birth to twins produce more milk and have greater total kid weight per maintenance doe unit. Daily weight gains after birth range from 50 to 150 grams per day (0.1 to 0.33 pound per day), but meat goat crosses can exceed 250 grams per day (0.55 pound per day). Rate of gain will be determined by diet and the end product desired (e.g., replacement doeing or various weights depending on the meat market).

The three most important management recommendations to ensure efficiency and productivity of a dairy goat enterprise are as follows:

1. Manage young does to have them ready for breeding at seven months of age. This increases the total lifetime herd production of milk and meat and reduces the number of nonproducing animals in the herd at any one time.
2. Encourage freshening of the does over as wide a time span as possible. This provides your customers with a year-round source of milk.
3. Cull animals to eliminate low producers. This can increase the herd productivity if animals are culled for genetic reasons.

Nutrition

To maintain milk production and good health, goats should be fed a diet balanced for energy, protein, minerals, and vitamins based on requirements defined by the National Research Council. To reduce costs, forages such as hay, silage, and pasture should constitute most of the daily diet. Goats are efficient browsers and can select a high-quality diet from lower-quality forages, especially when consuming nontradi-

Table 2. Milk production by dairy goat breed.

Breed	Milk Production Average (pounds)	Lactation Range (pounds)	Milk Fat (%)	Milk Protein (%)
Alpine	2,715	750–5,720	3.3	2.9
LaMancha	2,298	830–4,120	3.7	3.2
Nigerian Dwarf	795	220–2,110	6.4	4.4
Nubian	2,018	510–3,840	4.9	3.8
Oberhasli	1,995	1,120–3,050	3.7	3.0
Saanen	2,702	920–4,870	3.3	2.9
Sable	2,385	1540–3120	3.3	2.9
Toggenburg	2,237	1,090–3,840	3.1	2.9

Source: 2019 DHIR data.

Individual doe data not adjusted for age (275- to 305-day records).

tional pasture plants (e.g., weeds, shrubs). Available forages should be evaluated based on plant species and maturity, with the highest-quality forages reserved for pregnant, lactating, and growing animals.

Supplementing the diet with grain mixes to provide additional energy and protein is important, especially during lactation. Grain mixes may also contain supplemental minerals and vitamins. Feeding grain should be limited because a high-grain diet with low fiber intake can lead to rumen health problems (e.g., indigestion, acidosis) and lower milk fat content. Availability of dietary energy is important for high milk yields, while protein and fiber affect milk quality. High-producing does require quality forages and supplemental grain at a rate of 1 pound per 2.5 to 3 pounds of milk.

Forages generally do not contain sufficient minerals to meet dietary requirements, so supplements are usually required. Mineral mixes of salt with calcium, phosphorus, and trace minerals are typically used. Legume forages (e.g., alfalfa, clover) contain sufficient calcium and will only require phosphorus with a trace mineral supplement.

If pasture is the predominant source of forage, then vitamin supplements are not critical. If only hay or silage is used, then supplemental vitamins A, D, and E will be required. Vitamins can be supplied in a free-choice mineral source or the grain mix. Commercial cow rations or custom grain mixes varying from 14 to 20 percent protein can be fed to goats (Table 3). Most products formulated for sheep will not contain enough copper for goats.

It is important to routinely use a technique called “body condition scoring” to evaluate the adequacy of the nutritional program you use. Body condition scoring categorizes animals in scores from 1 (emaciated) to 5 (obese) based on the amount of palpable subcutaneous fat over the loin, ribs, and sternum. Does should have adequate (score 3) body reserves in late pregnancy as they enter lactation. High-producing does lose significant body condition during early lactation, but they should regain it again during late lactation and early pregnancy. Details on body condition scoring can be found on the American Dairy Goat Association website, <https://adga.org/>.

Herd Health and Biosecurity

Goats, for the most part, are a hardy species that require only basic necessities to survive and produce a quality product. Most herd problems are related to nutrition and reproduction, but a few diseases are of concern. Some goat diseases can also infect people, so handlers must be careful. Seek the services of a veterinarian to help you develop an appropriate herd health program.

Parasites, both internal and external, are the most important concern for goat health and productivity. Weight loss, rough hair coat, and diarrhea are common signs of parasitism. Anemia (pale mucous membranes) can also be an indicator of internal parasites. A veterinarian or trained herdsman can determine if internal parasites are present by examining a fresh fecal sample. An increasing problem with parasite control in goats is parasite resistance to dewormers due to repeated use of dewormers without other parasite-control management. Basic parasite control practices include:

- Treating only sick animals
- Practicing proper sanitation such as keeping feeders and waterers free from feces and bedding
- Avoiding overcrowding
- Practicing good pasture management and rotation
- Isolating sick animals
- Isolating new animals for 30 days before incorporating them into the herd

Because of year-round parasite problems, goats from the southeastern United States often harbor dewormer-resistant internal parasites. You will need to address this biosecurity issue if you plan on purchasing animals from this area.

Important infectious diseases of goats include caseous lymphadenitis (CL), caprine arthritis-encephalitis (CAE) virus, *Mycobacterium avium* spp. *paratuberculosis* (Johne’s disease), and contagious ecthyma (or sore mouth). These diseases are best controlled by practicing good biosecurity since they are readily passed by animal contact or through milk from an infected doe. There is essentially no treatment for these diseases, and vaccines are available only for CL and sore mouth. It is recommended that you only vaccinate for sore mouth if there has been a history of the disease on your farm or within the herd. Work with a veterinarian to establish good screening test protocols for purchasing animals and a basic farm biosecurity program to prevent disease spread.

Other health problems for goats include foot rot, abortion, and mastitis. Foot rot is typically a bacterial infection of the skin between the hooves. Foot rot control starts with biosecurity to prevent infected animals from being brought onto the farm. It can also be reduced by good preventive care that includes routine hoof trimming. Nutrition and infectious agents can cause abortion in goats. Toxoplasmosis, transmit-

Table 3. Example grain mixes with varying protein content for goats.

Concentrate Protein Content (% of mix)	14	16	18	20
Ingredient	% of Total			
Cracked or rolled corn	40.0	35.0	29.0	24.0
Rolled oats	20.0	20.0	20.0	20.0
Soybean meal (44%)	17.0	22.0	28.0	33.0
Beet or citrus pulp	10.0	10.0	10.0	10.0
Molasses	10.0	10.0	10.0	10.0
Trace mineral salt ¹	1.0	1.0	1.0	1.0
Limestone ²	1.0	1.0	1.0	1.0
Dicalcium phosphate ²	0.7	0.7	0.7	0.7
Magnesium oxide	0.2	0.2	0.2	0.2
Vitamin premix ³	0.1	0.1	0.1	0.1

¹Must contain adequate selenium in deficient areas.

²Amounts can be varied to adjust to legume or grass forages.

³Should provide 1,000 IU/lb vitamin A, 500 IU/lb vitamin D, and 5 IU/lb vitamin E.

ted by young cats, can cause abortion in both women and goats. Prevention requires keeping cat feces from contaminating feed consumed by pregnant goats. Mastitis, an infection of the udder, is a major concern with dairy goats. Providing sanitary conditions, good milking procedures, well-ventilated housing, and dry bedding is the best defense against this disease. Injuries to the udder and teat ends also contribute to this disease, which can lower milk production and cause permanent damage to the doe.

Housing and Equipment

There are four requirements for efficient dairy goat housing. First, the building should be adequately ventilated, and the walls and ceiling should be free from condensation. Second, the bedded area should be dry and clean. Third, feeders and watering devices must be well built and located so that feed and water are not contaminated with animal waste. Ready access to good-quality water is essential for milk production and herd health. Fourth, housing should be arranged to minimize the amount of labor and time required for maintaining a clean facility.

A number of housing systems can be successfully used for goat production. In the northeastern United States, either loose (manure pack) or confinement (individual stalls) housing systems, with or without pasture access, are necessary to provide sufficient protection from adverse weather. Building adequate fencing to keep the goats contained can be a real challenge. The best fencing for goats is electrified woven wire or 2-foot by 4-foot livestock panels that are at least 48 inches high.

The milking area should be separated from the stable area and have a nonporous floor, such as concrete, to make cleaning easy. The milking platform should be 15 to 18 inches higher than the floor to permit easy milking. Milk must be cooled immediately after milking and held at a temperature under 40°F until processed or consumed. Cooling is critical to retain milk flavor and quality. Bacteria in warm milk begin to multiply quickly and cause milk quality to deteriorate. Cold water is more efficient than cold air for cooling milk. The refrigerator or cooler for small herds should accommodate a pan of water equal to the amount of milk in one or more milking buckets. A herd producing 10 or more gallons per day will need a water-immersion cooler or a bulk tank cooler.

Environmental Regulations

All agricultural operations in Pennsylvania, including small-scale and part-time farming enterprises, operate under the Pennsylvania Clean Streams Law. A specific part of this law is the Nutrient Management Act. Portions of the act may or may not pertain to your operation, depending on whether you have livestock on your farm. However, all operations may be a source of surface water or groundwater pollution. Because of this possibility, you should contact your local Soil and Water Conservation District to determine what regulations may pertain to your operation. All farms with any livestock in Pennsylvania are required to have an approved manure management plan in place.

Risk Management

You should carefully consider how to manage risk on your farm. First, you should insure your facilities and equipment. This may be accomplished by consulting your insurance agent or broker. It is especially important to have adequate levels of property, vehicle, and liability insurance. You will also need workers compensation insurance if you have any employees. You may also want to consider your needs for life and health insurance and if you need coverage for business interruption or employee dishonesty. For more on agricultural business insurance, see “Agricultural Alternatives: Agricultural Business Insurance” at <https://extension.psu.edu/agricultural-business-insurance>. Second, check to see if there are multiperil crop insurance programs available for your crop or livestock enterprises. There are crop insurance programs designed to help farmers manage both yield risk and revenue shortfalls. However, individual crop insurance coverage is not available for all crops. If individual coverage is not available for what you grow, you may be able to use the Whole-Farm Revenue Protection (WFRP) program to insure the revenue of your entire farm operation. Information from your Schedule F tax records (or a “Substitute Schedule F for WFRP Purposes” if you do not file a Schedule F) from the past five consecutive years is used to calculate the WFRP policy’s approved revenue guarantee. Operations that have expanded over time may be allowed to increase the approved revenue amount based on an indexing procedure. Depending on the number of commodities grown, you have the choice of coverage of 50 to 85 percent of your approved revenue. Coverage and premium costs depend on the level of diversification in your operation; the maximum level of insured revenue is \$8.5 million (based on maximum adjusted gross revenues of \$17 million and the 50 percent coverage level). WFRP also provides replant coverage if it not already covered under an underlying individual crop policy. More information on WFRP can be found at <https://www.rma.usda.gov/en/Policy-and-Procedure/Insurance-Plans/Whole-Farm-Revenue-Protection>. Finally, the USDA Farm Service Agency has a program called the Noninsured Assistance Program (NAP) that is designed to provide a minimal level of yield risk protection for producers of commercial agricultural products that don’t have multiperil crop insurance coverage. NAP is designed to reduce financial losses when natural disasters cause catastrophic reduction in production. A basic level of coverage (50 percent of expected production at 55 percent of the average market price) is available for a fee of \$325 per crop per county (fees are capped at \$825 per producer per county, but not to exceed a total of \$1,950 for producers growing crops in multiple counties). Higher levels of protection at the 50, 55, 60, and 65 percent levels at 100 percent of the average market price are available for additional premium. NAP coverage is available through your local USDA Farm Service Agency office. The application fee for this program may be waived for eligible limited-resource farmers.

Sample Budget

The sample budget included in this publication provides examples of costs and returns to a commercial milk goat production system for 50 does and guidelines for initial resource requirements. These initial resource requirements may vary if you have existing equipment or structures that may be adapted for use in your enterprise. This sample budget should help ensure that all costs and receipts are included in your calculations. Costs and returns are often difficult to estimate in budget preparation because they are numerous and variable. Therefore, think of the data in these budgets as approximations and make the appropriate adjustments using “Your Estimate” column to reflect specific situations. These budgets are developed for a herd size of 50 does; however, your scale of production should be based on your market considerations. More information on the use of crop budgets can be found in “Agricultural Alternatives: Budgeting for Agricultural Decision Making” at <https://extension.psu.edu/budgeting-for-agricultural-decision-making>.

Initial Resource Requirements

- Land: 10 acres
- Labor (per head): 15 hours × 50 does = 750 hours
- Capital:
 - Livestock (per head): \$150–\$200 × 50 does = \$7,500–\$10,000
 - Existing buildings, improvements, fencing: \$15,000–\$20,000
 - Milking equipment, storage: \$20,000–\$30,000
- Equipment:
 - Tractor
 - Manure spreader
 - Crop production equipment

For More Information

Publications

- Baird, N., and D. G. Pugh. *Sheep and Goat Medicine*. Philadelphia: Saunders, 2001.
- Belanger, Jerry. *Storey's Guide to Raising Dairy Goats*. 5th ed. North Adams, Mass.: Storey, 2018.
- Caldwell, Gianaclis. *The Farmstead Creamery Advisor*. White River Junction, Vt.: Chelsea Green, 2010.
- Carroll, Ricki and Robert. *Cheesemaking Made Easy*. North Adams, Mass.: Storey, 1995.
- Dairy Reference Manual*. Northeast Regional Agricultural Engineering Service Cooperative Extension, 1995.
- Dunn, Peter. *The Goatkeeper's Veterinary Book*. 4th ed. Great Easton, Essex, England: 5m Publishing, 2007.
- Harper, J. K., S. Cornelisse, L. F. Kime, and J. Hyde. “Agricultural Alternatives: Budgeting for Agricultural Decision Making.” University Park: Penn State Extension, 2019.
- Kime, L. F., J. A. Adamik, J. K. Harper, and C. Dice. “Agricultural Alternatives: Agricultural Business Insurance.” University Park: Penn State Extension, 2019.
- Matthews, John. *Diseases of the Goat*. 2nd ed. Malden, Mass.: Blackwell Science.
- National Research Council Committee on Animal Nutrition. *Nutritional Requirements of Goats*. Washington, D.C.: National Academy Press, 1981. <https://www.nap.edu/catalog/130/nutrient-requirements-of-goats-angora-dairy-and-meat-goats-in>.
- Smith, Mary C., and David M. Sherman. *Goat Medicine*. 2nd ed. Hoboken, N.J.: Wiley-Blackwell, 2009.

Websites

- American Dairy Goat Association: <https://adga.org/>
Contains a number of educational resources on dairy goat production such as genetics and estimating body condition scoring.
- ATTRA, National Sustainable Agriculture Information Service: <https://attra.ncat.org/>
Contains a number of very detailed papers and resource checklists about small ruminant and dairy goat production enterprises.
- University of Langston E[Kika] de la Garza Institute for Goat Research: <http://www.luresext.edu>
Contains information on calculating goat nutrition requirements and estimating body condition score.

Continued on page 7

Sample Dairy Goat Budget (per doe, per year)

Does averaging two kids. Fixed costs are based on a 50-doe facility (artificial insemination) for 10-month milk period.

Item	Per Doe	Amount	Unit	Price	Total	Your Estimate
Receipts						
Milk sales*		15	cwt	\$75.50	\$1,132.50	
Does culled (5% death loss, 25% replacement rate)	0.25	120	pound	\$1.15	\$34.50	
Male kids sold (8% death loss)	0.92	30	pound	\$2.50	\$69.00	
Replacements sold (fertile, nonfertile)	0.67		head	\$130.00	\$87.10	
<i>Total receipts</i>					<i>\$1,323.10</i>	
Variable Costs						
Feed						
Concentrates for doe and replacement		8.5	cwt	\$30.38	\$258.23	
Concentrates for kids (sold for meat at 30 pounds)		0.4	cwt	\$32.28	\$12.91	
Minerals (loose)		45.6	pounds	\$0.68	\$31.03	
Hay (assuming pasture is available)		0.9	ton	\$220.00	\$198.00	
Milk fed to kid goats		1.6	cwt	\$75.50	\$120.80	
<i>Total feed costs</i>					<i>\$620.97</i>	
Other variable costs						
Building and equipment repairs		1	head	\$25.00	\$25.00	
Bedding (saw dust)		1	head	\$50.05	\$50.05	
Cleaning supplies		1	head	\$40.00	\$40.00	
Breeding fees		1	head	\$20.00	\$20.00	
Health program		1	head	\$15.00	\$15.00	
Milk testing (DHIA)		1	head	\$41.00	\$41.00	
Utilities, gasoline, and fuel oil		1	head	\$20.00	\$20.00	
Milk hauling		21.7	cwt	\$3.00	\$65.10	
Marketing, advertising, and coop costs		21.7	cwt	\$0.10	\$2.17	
Family and hired labor		15	hour	\$0.00	\$0.00	
<i>Total other variable costs</i>					<i>\$278.32</i>	
Interest on operating capital					\$64.82	
<i>Total variable costs</i>					<i>\$964.11</i>	
Fixed Costs						
Insurance and taxes		1	head	\$2.11	\$2.11	
Repairs and maintenance		1	head	\$4.23	\$4.23	
Milking equipment depreciation		1	head	\$22.75	\$22.75	
Building, other equipment depreciation		1	head	\$54.70	\$54.70	
Breeding livestock depreciation		1	head	\$49.50	\$49.50	
<i>Total fixed costs</i>					<i>\$133.30</i>	
Total Costs					\$1,097.41	
Returns over variable costs					\$358.99	
Returns to management					\$225.69	

*Goat milk weighs 8.6 pounds per gallon. The price per cwt is calculated at \$6.50 per gallon. Monitor local markets and contact suppliers to update values for all items contained in this sample budget.

Continued from page 5

University of Maryland Small Ruminant Website: <https://www.sheepandgoat.com/>

Contains a wide variety of information from many resources from around the world.

Periodicals

Goat Journal

145 Industrial Drive
Medford, WI 54451

<https://backyardgoats.iamcountryside.com/>

United Caprine News

P.O. Box 328
Crowley, TX 76036

Registry Associations

American Dairy Goat Association

P.O. Box 865
Spindale, NC 28160

<https://adga.org/>

American Goat Society, Inc.

Rt. 1, Box 56
Esperanle, NY 12066

<https://americangoatsociety.com/>

International Goat, Sheep, Camelid Registry

P.O. Box 462
Goshen, UT 84633

<https://www.igscr-idgr.com/NEW/>

Milking Goat and Sheep Equipment

Caprine Supply

P.O. Box Y
De Soto, KS 66018

<https://www.caprinesupply.com/>

DeLaval

3000 Lakeside Drive
Suite 305

South Bannockburn, IL 60015

<https://corporate.delaval.com/about/>

Fullwood & Bland Ltd.
Ellesmere, Shropshire
United Kingdom SY12 9DF
<https://fullwoodpacko.com/>

Gascoigne Milking Equipment, Ltd.
Edison Road, Hound Mills
Basingstoke, Hampshire
United Kingdom RG21 2YJ

Hamby Dairy Supply
2402 SW Waterstreet Road
Maysville, MO 64469
<https://hambydairysupply.com/goat-milking-equipment/>

Hastings Welding
1630 Vermillion Street
Hastings, MN 55033

New England Cheesemaking Supply Co.
P.O. Box 85
Ashfield, MA 01330
<https://cheesemaking.com/>

Parts Dept
58 Modley Road
Sharon, CT 06069
<https://www.partsdeptonline.com/>

The Schlueter Company
216 Center Street
P.O. Box 548
Janesville, WI 53547
<http://www.schlueterco.com/>

Tractor Supply
<https://www.tractorsupply.com>

Updated and modified by Robert J. Van Saun, former associate professor of veterinary science; Chelsea Hill, extension educator, Wayne County; Lynn F. Kime, senior extension associate; and Jayson K. Harper, professor of agricultural economics.

This publication, including its text, graphics, and images (“Content”), is for educational purposes only; it is not intended to be a substitute for veterinary medical advice, diagnosis, or treatment. Always seek the advice of a licensed doctor of veterinary medicine or other licensed or certified veterinary medical professional with any questions you may have regarding a veterinary medical condition or symptom.

extension.psu.edu

Penn State College of Agricultural Sciences research and extension programs are funded in part by Pennsylvania counties, the Commonwealth of Pennsylvania, and the U.S. Department of Agriculture.

Where trade names appear, no discrimination is intended, and no endorsement by Penn State Extension is implied.

This publication is available in alternative media on request.

Penn State is an equal opportunity, affirmative action employer, and is committed to providing employment opportunities to all qualified applicants without regard to race, color, religion, age, sex, sexual orientation, gender identity, national origin, disability, or protected veteran status.

© The Pennsylvania State University 2022

Code UA447 01/22pod