UNITED STATES LAMB RESOURCE CENTER

Increasing Your Lamb Crop Series

Accelerated Lambing Cycles

Introduction

Accelerated lamb production is a proven system that provides a consistent, year-round supply of lamb while increasing ewe productivity and production efficiency of the lamb production enterprise. This system of production has evolved from efforts in both Northern Europe (1,2) and America (3,4,5) that have sought to overcome the seasonal constraint in lamb production occurring with traditional, annual lambing systems. These systems differ in birth interval but are defined by the birth interval of an individual ewe of less than 12 months, with the majority of systems striving for ewes to lamb every 7 to 10 months. Therefore, ewes on these systems give birth at different periods from year to year thereby creating a year-round supply of lamb. This also creates an even cash flow for the farm, which is not possible with traditional, annual production, and allows for opportunities to borrow capital for expansion efforts.

Lambs sold throughout the year

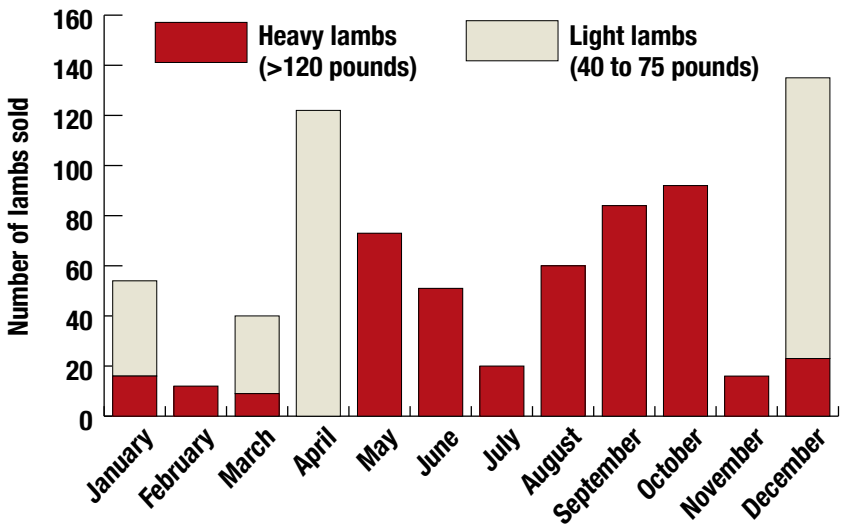

Figure 1. Example of lambs sold throughout the year from a 300 ewe accelerated farm. Lambs can be sold to fit many market endpoints depending on opportunity with this production system. Lambs can also be sold at a uniform size providing a consistent flow to market every month of the year.

Marketing flexibility and year-round supply

Accelerated systems allow more opportunistic marketing possibilities, which is advantageous in reducing risk. As markets fluctuate within and between years, accelerated production units are able to adapt and change target markets quickly as this system allows diverse marketing options. Lambs can be sold as market-ready, light lambs for the non-traditional market (35 to 80 pound lambs), as heavier, older lambs for the traditional market (>125 pound lambs), or for weights in between, depending on market conditions (Figure 1). Perhaps the greatest selling point for accelerated production is that the creation of a consistent, year-round supply allows a producer to build markets that would not be possible for traditional, annual, seasonal production systems. These markets pay premiums for this consistent, year-round supply of young, lean quality product.

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Types of accelerated systems

Several types of accelerated systems exist with the two most common known as the "8-month" system (three lambings per ewe in two years, ref. 2,3) and the "STAR®" system (five lambings in three years, ref. 5). Important system differences include birth interval, time to re-breeding, and system flexibility.

Table 1. Comparison of two popular accelerated lamb production systems.

	STAR®	8-month
Minimum birth interval	7.2 months	7-9 months
Lactation length	42-72 days	~42-100 days
Breeding period	<30 days	<51 days
Time to re-breeding	72 days	~120/60[1] days
Lambing periods/year	5	3/6[1]
Breeding periods/year	5	3/6[1]
Maximum births/ewe/year	1.67	1.5

[1] Lambing periods can be doubled to six if two 8-month systems are used within an operation and offset by 2 months. This would also reduce the time to re-breeding to as little as 60 days if non-pregnant ewes are identified early and placed in the next breeding period of the opposing schedule.

The 8-month system excels in providing:

- more time for recovery following lactation,
- long pre-weaning periods,
- potentially larger lamb weaning weights, and
- a less rigid schedule.

The STAR® allows for:

- faster re-breeding opportunities and
- greater overall flock productivity.

Other variations include two overlapping 8-month systems in which the systems are offset by two months. This allows for six lambing periods within a year with the advantages of shorter re-breeding periods and even greater consistency in lamb supply. This overlapping system also allows heightened labor efficiencies as employees can be trained for more specialized tasks.

Genetics resources for accelerated production

Sheep with extended breeding seasons are required for accelerated production (short to no anestrous period). These breeds that are less seasonal include many breeds common in North America (Figure 2). There is likely variation within breeds, as well as it is common to find some ewes and rams within even highly seasonal breeds that are capable of breeding out-of-season. Sheep breeds that are less seasonal include those that have evolved closer to the equator and those specifically selected for out-of-season breeding in higher latitudes. There is also evidence suggesting that crossbreeding (heterosis) improves out-of-season reproduction just as it does other reproductive traits (4). Therefore, producers interested in accelerated production are encouraged to maximize the use of crossbreeding to improve both out-of-season breeding and lambing rate.

Figure 2. Sheep breeds commonly available in the US that are more capable of conceiving year-round:

- Rambouillet
- Merino
- Horned and Polled Dorset
- Finnsheep
- Romanov
- Katahdin
- Dorper
- Hair sheep of west African descent
- Ile de France
- Polypay

Nutrition

In general, the nutritional requirements of accelerated production are higher as animals are in a more productive state a greater proportion of the time. The precise nutritional requirements of sheep in accelerated systems are not clearly defined, however, there is evidence (6,7) indicating that the plane of energy nutrition of both rams and ewes is more important for fertility during the less optimal breeding season (February through July in the northern hemisphere) than during the optimal breeding season. The extent, timing, and duration of improved plane of nutrition are not established, but producers are advised to improve energy intake of the ewe during late lactation and during the period just prior to breeding as is commonly done in pre-breeding flushing protocols to improve ovulation rate during the normal breeding season. During the less optimal, spring breeding season, improved energy intake may boost conception rates in ewes and improve libido in rams.

A challenge in the nutritional management of accelerated ewes is balancing the need to decrease energy intake just prior to and after weaning to minimize incidence of mastitis with the need to replenish energy reserves to improve out-of-season fertility. Producers with accelerated flocks typically decrease both energy

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and protein intake for 3 to 5 days pre-weaning and then begin to increase energy intake 3 days post-weaning improving it to a flushing level of energy intake by 2 weeks post-weaning.

Table 2. Proposed energy requirements of sheep in accelerated systems based on National Research Council (NRC) requirements for ewes raising, carrying and rearing twins (8), but altered to allow for greater energy intake during late lactation.

Period	Annual system*	Accelerated system*
2 weeks prior to breeding	1.4	1.4
Day 0-40 post conception (PC)	1.2	1.2
Day 40-115 PC	1.1	1.1
Day 115 to term	2.0	2.0
Day 0-30 of lactation	2.2	2.2
Day 30-60 of lactation	1.9	2.2

** Energy intake is expressed relative to maintenance energy requirements of non-pregnant adult ewes.*

Reproductive management

Reproductive technologies such as intravaginal controlled internal drug releasing devices (CIDRs) that provide a sustained source of progesterone supplementation to ewes, may be used to synchronize breeding and improve conception rates during the spring breeding season. CIDRs have been demonstrated to be effective in improving breeding synchronization, but their ability to improve conception rates above that observed using vasectomized "teaser" rams is less certain (9,10). The use of teaser rams to enhance reproductive management of sheep is commonly known as the "ram effect" (11). This form of bio-stimulation of reproduction is especially effective in improving conception in ewes on the "edge" of the normal breeding season, but is not as effective in improving conception in sheep that may be in the depth of the non-breeding season.

The use of artificial light to enhance sheep reproduction is an effective means of improving both ram and ewe fertility. Lighting protocols can greatly improve out-of-season fertility and ovulation rate in accelerated systems (12). Some of these protocols require conditions that are not feasible on many farms, including the use of a barn that must be kept dark along with proportionally more feeding of stored feed. Both of these conditions increase the cost of production and must be considered when evaluating the economics of improved productivity of these systems.

Infrastructure

In cold climates, an indoor lambing facility is needed for accelerated production as at least one of the lambing periods will take place in winter. (Figure 3) Although not an absolute

Figure 3. ***An insulated, indoor birth facility with a center aisle feeding system. This barn has sufficient attic insulation to stay above freezing during the vast majority of winter in southern Michigan with animal heat alone. Side wall curtain ventilation allows for air intake and exhaust. Balancing humidity and warmth requires management finesse in such a system.***

requirement, insulated birth facilities heated by supplemental heat or by capture of animal heat, allow for improved operator and animal comfort during winter birth periods. The size of these facilities can be smaller than for traditional, annual lambing programs using indoor facilities for a single birth period as less than 60% of the ewe flock typically gives birth in a given period.

Efficient feeding systems are critical for any sheep production system, whether it be a grazing program, one using machine harvested feeds, or a combination of both. This especially applies to accelerated production due to the greater nutritional needs of the sheep. Grazing programs can easily meet the nutritional needs of highly productive sheep for at least part of the production cycle but must be carefully managed to meet the higher requirements of the pre-breeding period, late pregnancy and lactation that collectively constitutes about half of the cycle. This may require greater investment in subdivision fencing and other grazing infrastructure. In most accelerated systems, investments in efficient forage feeding programs are also needed to reduce feeding labor and to meet the relatively higher nutritional needs of the flock. Larger operations commonly employ a total mixed ration feeding program to reduce labor and cost of feed, and to more effectively meet animal requirements during late pregnancy and lactation.

Barriers and challenges

The chief barrier to accelerated success is poor and variable out-of-season breeding success. Producers may struggle to achieve consistent breeding success during the spring. Particular emphasis must be placed on:

- Ram fertility and libido: screen with breeding soundness exams and monitor mating activity.
- Nutrition: ensure an adequate plane of nutrition prior to and during the breeding season.
- Genetics: source genetics with the capacity to breed out-of-season.

Pros and cons of accelerated production

Pro	Con
Year-round supply: create new and build existing markets	Precise management: nutrition, reproduction, health
Consistent cash flow	Requires a winter lambing period
Reduced market risk	Requires high-quality forage
Greater net income (per ewe, lamb, enterprise)	Requires steady labor
Even distribution of labor	

Choosing accelerated lambing

- Accelerated production systems are well suited for higher value, more productive land.
- Aseasonal genetics are key: light control protocols reduce risk.
- Accelerated production requires high-quality forages.
- Accelerated production requires a greater initial investment (indoor lambing facility, feeding, infrastructure); however, the higher productivity may create lower fixed cost per lamb produced when depreciated over time.
- Accelerated production evens labor over the year, but is a steady requirement.
- Accelerated production is a profitable option if the current annual program can attain greater than 1.3 lambs marketed per ewe.

Author & reviewers

Author: Richard Ehrhardt, Ph.D., Michigan State University, East Lansing, Michigan

Reviewers: Reid Redden, Ph.D., Texas A&M AgriLife Extension, San Angelo, Texas; Dan Morrical, Ph.D., Iowa State University, Ames, Iowa; Susan Schoenian, M.S., University of Maryland Extension, Keedysville, Maryland; and Rodney Kott, Ph.D., Former Montana State University Extension Sheep Specialist, Fredericksburg, Texas

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More information

U.S. Lamb Resource Center
http://lambresourcecenter.com/production-resources/productivity/

National Sheep Improvement Program
http://www.nsip.org

U.S. Sheep Industry Roadmap
http://lambresourcecenter.com/reports-studies/roadmap/

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