

# 4-H Beef Cattle Project

## Learning Outcomes

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The objective of this publication is to provide an overview of the learning outcomes for advanced-level youth who participate in the 4-H Beef Project. As the name implies, youth should complete these learning objectives after completing the intermediate-level objectives. This publication serves as a reference for Extension 4-H agents, volunteers, parents and youth at this level, and provides guidelines for the desired knowledge, skills and activities that should be obtained or completed by youth after completion of the 4-H Beef Project. Achieving these learning outcomes will expand upon the foundation of knowledge that was established by completing the beginner- and intermediate-level outcomes, and will prepare youth for future endeavors in the beef cattle industry.

### Fundamental Knowledge and Skills

Listed below are specific fundamental knowledge and skills that are relevant and important to achieving the advanced-level learning objectives of the 4-H Beef Project.

- **Industry**
  - Describe the influence of the dairy industry on beef cattle production.
  - Distinguish between the following practices: retained feedlot ownership, marketing fed cattle on a grid or quality basis, marketing fed cattle on a live basis.
  - Differentiate between intensive and extensive production management practices.
- **Genetics and evaluation**
  - Identify the advantages and disadvantages of each of the following major breeds of beef cattle in the U.S.: Angus, Brahman, Charolais, Chianina, Gelbvieh, Hereford, Limousin, Maine Anjou, Red Angus, Shorthorn and Simmental.
  - Model or outline the practice and benefit of cross-breeding in a commercial beef cattle herd.
  - Define and provide examples of the following terms: genomics (as it relates to beef cattle improvement), heritability, heterosis and single-nucleotide polymorphism.
  - Collect a DNA sample.

## 4-H Beef Project Learning Outcomes — Advanced

- Distinguish between standard and interim EPDs.
- Describe the role of each of the following EPDs: birth weight maternal (BWM), dry matter intake (DMI), residual average daily gain (RADG), maternal milk and growth (M&G), percent retail cuts (%Retail), residual feed intake (RFI), retail product (RP), teat size (TEAT), tenderness (Tend), total maternal (TM or TOTMAT), and 30-month pregnancy (Pg30).
- Describe the meaning of each of the following economically relevant indexes (ERIs): baldie maternal index (BMIS), Brahman influence index (BIIS), British maternal index (\$BMI), calving ease index (CEZ\$), carcass value index (CV), certified Hereford beef index (CHBS), efficiency profit index (EPI), feedlot merit index (FM), feedlot profit index (FPI), mainstream terminal index (\$MTI), and replacement female index (\$Cow).
- Apply EPDs and ERIs to beef cattle mating decisions.
- Apply across-breed EPD adjustment factors to a cross-breeding scenario.
- Describe the following genetic defects and to which breed they are most commonly associated: alpha-mannosidosis, contractual arachnodactyly, digital subluxation, hypotrichosis, idiopathic epilepsy, oculocutaneous hypopigmentation, osteopetrosis, protoporphyria, sodium channel neuropathy and syndactyly.
- **Nutrition**
  - Identify and distinguish between the following forages and feedstuffs: bahiagrass, bakery byproduct, bermudagrass, bluegrass, brewer's grains, candy byproduct, corn gluten meal, cracked corn, dallisgrass, feather meal, fish meal, high-moisture corn, hominy feed, limestone, peanut skins, poultry litter, red clover, sodium bicarbonate, steam-flaked barley, steam-flaked corn, steam-rolled oats, urea, white clover.
  - Describe cause of and treatment for the following nutrition-related metabolic disorders: acidosis, bloat, hypomagnesemia and fescue toxicosis.
  - Differentiate between the following feed types or manufacturing processes: cracking, crumbling, cubing, extrusion, grinding, meal (ground), milk replacer, pellet, pelleting, roasting, steam-flaking and texturized.
  - Determine the amount of feed and water that cattle should consume.
  - Calculate feed efficiency.
  - Complete Pearson-square ration formulation with two feedstuffs.
  - Define the following nutrients or nutrient analyses: acid detergent fiber, acid detergent lignin, cellulose, fat-soluble vitamins, hemicellulose, lignin, macrominerals, metabolizable protein, microminerals, net energy for maintenance, net energy for gain, neutral detergent fiber, non-protein nitrogen, rumen degradable protein, rumen undegradable protein and water-soluble vitamins.
- **Reproduction**
  - Distinguish between structure and function of the following components of a reproductive tract and to which sex they correspond: corpus albicans, corpus hemorrhagicum, corpus luteum, epididymis, follicle, oocyte, oviduct, retractor penis muscle, scrotum, spermatic cord, spermatocyte, uterine body, uterine horn and vagina.

- Describe the role of the following reproductive hormones: estrogen, gonadotropin releasing hormone, luteinizing hormone, oxytocin, progesterone, prostaglandin F<sub>2</sub>alpha and testosterone.
- Develop a plan that addresses the necessary precautions for handling and dangers of mishandling reproductive hormones.
- Define and distinguish between the following reproductive strategies, tools and technologies: artificial insemination, breeding soundness exam, cryopreservation, defined breeding season, embryo transfer, estrous synchronization, in vitro fertilization, natural service, pelvic area measurement, pregnancy diagnosis, scrotal circumference, semen morphology, semen motility and sex-sorted semen.
- Develop a breeding plan that takes into account the ideal age at first calving for a heifer and ideal generation interval for a cow.
- List the components of a breeding soundness exam.
- Describe the importance of establishing and maintaining a defined calving season.
- **Health and welfare**
  - Differentiate between modified-live and killed virus vaccines.
  - Demonstrate your ability to administer subcutaneous and intramuscular injections.
  - Create a comprehensive vaccination protocol.
  - Demonstrate your ability to handle and store antibiotics, needles, syringes and vaccines.
  - Define the following terms: adjuvant, anthelmintic, anticoagulant, antigen, antimicrobial resistance, fecal egg count, immunology, immunoglobulin, innate immune system, over-the-counter, prescription, prophylactic and veterinary feed directive.
  - Describe and distinguish between the following diseases and conditions: anaplasmosis, bovine leukosis virus, bovine respiratory syncytial virus, infectious bovine rhinotracheitis, Johne's disease, leptospirosis, pasteurella and vibriosis.
  - Distinguish between normal and persistently infected bovine viral diarrhea.
  - Demonstrate your ability to apply an ear tag, ear tattoo, freeze brand and EID tag.
- **Carcass and beef products**
  - Identify and distinguish between the following retail beef cuts and to which wholesale cut they correspond: back ribs, blade chuck roast, blade chuck steak, brisket flat, brisket point, chuck center roast, chuck center steak, chuck eye roast, chuck eye steak, country-style ribs, flank steak, flat iron steak, petite tender medallions, petite tender roast, ribeye cap steak, ribeye filet, ribeye petite roast, seven-bone chuck roast, short ribs, skirt steak, strip filet, strip petite roast, top blade steak and top sirloin filet.
  - Differentiate between the following degrees of carcass marbling: practically devoid, traces, slight, small, modest, moderate, slightly abundant, moderately abundant and abundant.
  - Determine the following measurements and calculations: back fat thickness, dressing percent, hot carcass weight, percent kidney, pelvic, and heart fat (KPH), ribeye area, USDA yield grade and USDA quality grade.
  - Use carcass measurements to estimate the quantity of retail product from a carcass.

- **Performance measurements**
  - Calculate the following economically relevant measurements: pounds of calf weaned per cow exposed, pounds of calf weaned per pound of cow exposed, pounds of calf weaned per acre and lifetime calving interval.
  - Define a contemporary group.
- **Economics and marketing**
  - Define “shrink” and describe its effect on cattle value.
  - Describe a buy/sell margin.
  - Visually distinguish between live feeder cattle of various USDA frame size, thickness and thriftiness grades.
  - Calculate the following: feed cost of gain and total cost of gain (stocker and feedlot), feed cost of maintenance, and total cost of maintenance (cow/calf).
  - Use a budget to calculate profit and loss of a beef cattle enterprise (cow/calf, stocker or feedlot).

## Educational Contests, Programs and Certifications

Listed below are specific activities that are relevant and important to achieving the advanced-level learning objectives of the 4-H Beef Project.

- Participate in one or more Skillathon contests.
- Compete in one or more livestock judging contests.
- Maintain Beef Quality Assurance certification.
- Complete the Tennessee Advanced Master Beef Producer Program.

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