

Livestock Calculations for Skillathon Contests



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Introduction

There are many different calculations that are helpful in commercial livestock production and when raising a livestock project. A good knowledge of these calculations is important for understanding the various factors associated with live animal performance, carcass characteristics, economics of production, and profitability. Because of the important information that these calculations provide about livestock, they are an important part of many Livestock Skillathon Contests. This publication will highlight the various livestock calculations that are used in Skillathon Contests in Kentucky.

Common Livestock Calculations

The table at the end of this publication shows the livestock calculations that will be required for Clover, Intermediate, and Senior Contestants. A brief description of the information these calculations provide, and the formula for how they are calculated, is as follows.

- **Weight gain** – the total weight an animal has gained for a given period of time.

$$= \text{ending weight} - \text{starting weight}$$

- **Average daily gain (ADG)** – the average amount of weight an animal has gained each day for a given period of time the animal has been on feed.

$$= \text{weight gain} \div \text{number of days on feed}$$

- **Feed per pound of gain (F/G)** – also called feed conversion, this is the amount of feed that is eaten by an animal for each pound of weight the animal gained.

$$= \text{pounds of feed fed} \div \text{weight gain}$$

- **Feed cost** – the total cost of all the diets and (or) feedstuffs that were fed to an animal.

$$= (\text{pounds of diet or feedstuff fed} \times \text{diet or feedstuff cost}) \\ + (\text{pounds hay fed} \times \text{hay cost})$$

- **Feed cost per pound of gain** – the feed cost for each pound of weight that was gained by the animal.

$$= \text{feed cost} \div \text{weight gain}$$

- **Weight per day of age (WDA)** – the average weight that was gained by animal for each day of its life.

$$= \text{weight in pounds} \div \text{age in days}$$

- **Shrink** – the difference in an animal's full weight and its empty weight (used to measure the total amount of weight an animal loses while being transported from one place to another). This weight loss is typically the contents of the stomach and intestines that has past out of the animal.

$$= \text{full weight} - \text{empty weight}$$

- **Percent shrink** – the proportion (percentage) of an animal's weight that is lost during transport from one place to another relative to its full live weight before it was transported.

$$= (\text{shrink} \div \text{full weight}) \times 100$$

- **Dressing loss** – the difference in weight between an animal's live weight and its carcass weight. This weight difference is the parts of the animal that are removed during slaughtering and processing (head, feet, tail, guts, and hide, wool, or hair).

$$= \text{live weight} - \text{carcass weight}$$

- **Dressing percentage** – the proportion (percentage) of an animal's carcass weight relative to its live weight.

$$= (\text{carcass weight} \div \text{live weight}) \times 100$$

- **Break even cost** – represents the total amount of money an animal must be sold for to cover all of the costs associated with raising the animal (the sale price that is needed to cover all costs).

$$= \text{total of all costs}$$

■ **Break even cost per pound** – represents the total amount of money an animal must be sold for to cover all of the costs associated with raising the animal, expressed on a per pound of sale weight basis (the sale price on a per pound of live weight basis that is needed to cover all costs).

$$= \text{break even cost} \div \text{sale weight}$$

■ **Feeding margin** – also referred to as profit margin, this value represents the difference between an animal's sale price and the break even cost (the amount of profit the animal generated).

$$= \text{sale price} - \text{break even cost}$$

■ **Feeding margin per pound** – the amount of profit the animal generated on a per pound of sale weight basis.

$$= \text{feeding margin} \div \text{sale weight}$$

■ **Carcass break even cost** – represents the total amount of money an animal must be sold for to cover all of the costs associated with raising the animal, expressed on a carcass weight basis (the sale price on a per pound of carcass weight basis that is needed to cover all costs).

$$= \text{break even cost} \div \text{carcass weight}$$

■ **Carcass profit margin per pound** – the feeding margin (profit margin) expressed on a per pound of carcass weight basis.

$$= \text{feeding margin} \div \text{carcass weight}$$

■ **Performance ratio** – a measure of how an animal's performance for a given trait (such as weaning weight) compares to the average performance of their contemporary group for that trait.

$$= (\text{individual performance} \div \text{average performance of group}) \times 100$$

Example Scenarios

In most Skillathon Contests, contestants will be given a scenario and asked to calculate some of the livestock calculations from information contained in the scenario. The following are examples of the kinds of scenarios that are typically used.

Example Scenario 1

On May 1, Tommy's project pig weighed 50 pounds. On July 1 (60 days later) his pig weighed 140 pounds. During the 60 day feeding period, Tommy's pig ate 250 pounds of feed. The feed Tommy fed his pig cost \$0.08 (8¢) per pound. Determine the weight gain, average daily gain, feed per pound of gain, and feed cost per pound of gain for Tommy's pig during this time period.

- a. Weight gain
 - = *ending weight* – *starting weight*
 - = 140 lbs – 50 pounds lbs
 - = 90 pounds weight gain
- b. Average daily gain
 - = *weight gain* \div *number days on feed*
 - = 90 lbs \div 60 days
 - = 1.50 lbs of gain per day
- c. Feed per pound of gain
 - = *pounds of feed fed* \div *weight gain*
 - = 250 lbs of feed \div 90 lbs weight gain
 - = 2.78 lbs feed per lb of gain
- d. Feed cost per pound of gain
 - = *feed cost* \div *weight gain*
 - = (250 lbs feed \times \$0.08 per lb) \div 90 lbs wt gain
 - = \$20 feed cost \div 90 lbs wt gain
 - = \$0.22 feed cost per lb of gain

Example Scenario 2

From May 1 to August 10 Suzie's project market lamb gains 55 pounds. During this time, Suzie's lamb was fed 300 pounds of a show lamb diet which cost \$0.12 (12¢) per pound and 25 pounds of hay which cost \$0.06 (6¢) per pound. What was the feed cost and feed cost per pound of gain for Suzie's project lamb during this period of time?

- a. Feed cost
 - = (*lbs diet fed* \times *diet cost*) + (*lbs hay fed* \times *hay cost*)
 - = (300 lbs diet \times 12¢ per lb) + (25 lb hay \times 6¢ per lb)
 - = \$36.00 for grain + \$1.50 for hay
 - = \$37.50 feed cost
- b. Feed cost per pound of gain
 - = *feed cost* \div *weight gain*
 - = \$37.50 feed cost \div 55 lbs wt gain
 - = \$0.68 feed cost per lb of gain

Example Scenario 3

Bill has a 160-day old market pig that he is taking to show at the county fair. Bill weighs his pig before loading it for the trip to the fair and finds that it weighs 250 pounds. Upon arriving at the county fair, Bill weighs the pig again and finds that it now weighs 240 pounds. Determine the weight per day of age of Bill's market pig (using the weight of the pig that was taken before going to the fair), the shrink of Bill's pig, and the percent shrink of Bill's pig.

- a. Weight per day of age
 - = *weight in pounds* \div *age in days*
 - = 250 lbs \div 160 days of age
 - = 1.56 lbs per day of age
- b. Shrink
 - = *full weight* – *empty weight*
 - = 250 lbs – 240 lbs
 - = 10 lbs shrink

- c. Percent shrink
 $= (\text{shrink} \div \text{full weight}) \times 100$
 $= (10 \text{ lbs shrink} \div 250 \text{ lbs}) \times 100$
 $= 0.04 \times 100$
 $= 4\% \text{ shrink}$

Example Scenario 4

Peggy Sue's purchased a 750 pound crossbred market steer for her livestock project. When she sold the steer to a local meat processor it weighed 1,200 pounds and produced a 750 pound carcass. What was the dressing loss and dressing percentage for Peggy Sue's steer?

- a. Dressing loss
 $= \text{live weight} - \text{carcass weight}$
 $= 1,200 \text{ lbs} - 750 \text{ lbs}$
 $= 450 \text{ lbs dressing loss}$
- b. Dressing percentage
 $= (\text{carcass wt} \div \text{live wt}) \times 100$
 $= (750 \text{ lbs} \div 1,200 \text{ lbs}) \times 100$
 $= 62.6\% \text{ dress}$

Example Scenario 5

Fred purchased his Simmental x Angus project steer for \$600 from a cattle producer in an adjoining county. He paid the producer an additional \$20 to haul the steer to his farm. During the feeding period Fred purchased \$225 worth of feed for the steer, and paid his local veterinarian \$25 to treat the steer for warts. When the steer reached 1,100 pounds Fred paid a \$10 entry fee and took his steer to the Sunnyside County Fair. After the show, Fred sold the steer in the Sunnyside County Fair auction for \$1,000. The steer produced a 685 pound carcass. Determine Fred's break even cost, break even cost per pound, feeding margin, feeding margin per pound, carcass break even cost, and carcass profit margin per pound.

- a. Break even cost
 $= \text{total of all costs}$
 $= \$600 \text{ purchase price} + \$20 \text{ hauling fee} + \$225 \text{ in feed} + \$25 \text{ vet bill} + \10 entry fee
 $= \$880 \text{ break even cost}$
- b. Break even cost per pound
 $= \text{break even cost} \div \text{sale weight}$
 $= \$880 \text{ break even cost} \div 1,100 \text{ lbs}$
 $= \$0.80 \text{ break even cost per lb}$
- c. Feeding margin
 $= \text{sale price} - \text{break even cost}$
 $= \$1,000 \text{ sale price} - \$880 \text{ break even cost}$
 $= \$120 \text{ feeding margin}$
- d. Feeding margin per pound
 $= \text{feeding margin} \div \text{sale weight}$
 $= \$120 \text{ feeding margin} \div 1,100 \text{ lbs}$
 $= \$0.11 \text{ feeding margin/lb}$

- e. Carcass break even cost
 $= \text{break even cost} \div \text{carcass wt}$
 $= \$880 \text{ break even cost} \div 685 \text{ lb carcass}$
 $= \$1.28 \text{ carcass break even cost}$
- f. Carcass profit margin per pound
 $= \text{feeding margin} \div \text{carcass weight}$
 $= \$145 \text{ feeding margin} \div 685 \text{ lb carcass}$
 $= \$0.21 \text{ carcass profit margin per lb}$

Example Scenario 6

Farmer Joe has three Dorset rams for sale. Ram A had a 60-day adjusted weaning weight of 65 pounds, Ram B had a 60-day adjusted weaning weight of 55 pounds, and Ram C had a 60-day adjusted weaning weight of 60 pounds. Calculate the 60-day adjusted weaning weight performance ratio for each of these rams.

- a. Performance ratio
 $= (\text{individual performance} \div \text{average performance of group}) \times 100$

Ratio for Ram A

$$= \{65 \text{ lbs} \div [(65 \text{ lbs} + 55 \text{ lbs} + 60 \text{ lbs}) \div 3]\} \times 100$$

$$= (65 \text{ lbs} \div 60 \text{ lbs}) \times 100$$

$$= 108$$

Ratio for Ram B

$$= \{55 \text{ lbs} \div [(65 \text{ lbs} + 55 \text{ lbs} + 60 \text{ lbs}) \div 3]\} \times 100$$

$$= (55 \text{ lbs} \div 60 \text{ lbs}) \times 100$$

$$= 92$$

Ratio for Ram C

$$= \{60 \text{ lbs} \div [(65 \text{ lbs} + 55 \text{ lbs} + 60 \text{ lbs}) \div 3]\} \times 100$$

$$= (60 \text{ lbs} \div 60 \text{ lbs}) \times 100$$

$$= 100$$

Example Scenario 7

For the past 125 days you have been feeding a group of 500 pigs in your finishing unit. You initially purchased these pigs for \$45 per head when they weighed 50 pounds. During the feeding period the pigs have consumed 157 tons of a diet which costs \$125 per ton. In addition to the feed costs, you have incurred other expenses totaling \$14 per pig (this includes labor, medications and veterinarian expenses, utilities, building and equipment repairs, transportation costs, marketing fees, and accounting fees). You weighed the pigs today on the farm just before loading them to be sold to a major pork processor, and the pigs averaged 250 pounds body weight. Upon arrival at the pork processing plant, the pigs were weighed and averaged 245 pounds. The sale price of the pigs was \$45 per hundredweight. Determine the following animal performance and economic measures for the pigs.

- a. Average weight gain
 $= \text{average ending weight} - \text{average starting weight}$
 $= 250 \text{ lbs} - 50 \text{ lbs}$
 $= 200 \text{ lbs weight gain}$

- b. Average daily gain for the group
 = $\text{average weight gain} \div \text{number days on feed}$
 = $200 \text{ lbs} \div 125 \text{ days}$
 = 1.60 lbs of gain per day
- c. Average feed conversion
 = $\text{pounds of feed fed} \div \text{weight gain}$
 = $(157 \text{ tons feed} \div 500 \text{ pigs}) \div 200 \text{ lbs weight gain}$
 = $628 \text{ lbs feed per pig} \div 200 \text{ lbs weight gain}$
 = 3.14 lbs feed per lb of gain
- d. Feed cost for the group
 = $\text{amount of feed fed} \times \text{diet cost}$
 = $157 \text{ tons of feed} \times \$125 \text{ per ton of feed}$
 = \$19,625 total feed cost for the group
- e. Feed cost per head
 = $\text{feed cost for group} \div \text{number of pigs}$
 = $\$19,625 \text{ total feed cost} \div 500 \text{ pigs}$
 = \$39.25 feed cost per head
- f. Feed cost per pound of gain
 = $\text{feed cost per head} \div \text{average weight gain}$
 = $\$39.25 \text{ feed cost per head} \div 200 \text{ lbs weight gain}$
 = \$0.20 feed cost per lb of gain
- g. Average shrink
 = $\text{average full weight} - \text{average empty weight}$
 = $250 \text{ lbs} - 245 \text{ lbs}$
 = 5 lbs average shrink

- h. Average percent shrink
 = $(\text{average shrink} \div \text{average full weight}) \times 100$
 = $(5 \text{ lbs average shrink} \div 250 \text{ lbs}) \times 100$
 = 0.02×100
 = 2% shrink
- i. Break even cost per head
 = $\text{total of all costs}$
 = $\$45 \text{ purchase price} + \$39.25 \text{ feed cost} + \$14 \text{ in other expenses}$
 = \$98.25 break even cost per head
- j. Break even cost per pound
 = $\text{break even cost} \div \text{average sale weight}$
 = $\$98.25 \text{ break even cost} \div 245 \text{ lbs sale weight}$
 = \$0.40 break even cost per lb
- k. Profit (feeding) margin per head
 = $\text{sale price} - \text{break even cost}$
 = $(\$45 \text{ per cwt} \times 245 \text{ lbs sale wt}) - \$98.25 \text{ break even cost}$
 = $\$110.25 \text{ sale price} - \$98.25 \text{ break even cost}$
 = \$12 profit margin per head
- l. Profit (feeding) margin per pound
 = $\text{profit margin per head} \div \text{average sale weight}$
 = $\$12 \text{ profit margin} \div 245 \text{ lbs sale weight}$
 = \$0.05 profit margin per lb

Livestock Calculations Used in Kentucky Skillathon Contests

<i>Clover Contestants</i>	<i>Intermediate Contestants</i>	<i>Senior Contestants</i>
Weight gain	Weight gain	Weight gain
Average daily gain	Average daily gain	Average daily gain
Feed per pound of gain	Feed per pound of gain	Feed per pound of gain
Feed cost per pound of gain	Feed cost	Feed cost
Weight per day of age	Feed cost per pound of gain	Feed cost per pound of gain
Shrink	Weight per day of age	Weight per day of age
Dressing loss	Shrink	Shrink
Break even cost	Percent shrink	Percent shrink
Feeding margin	Dressing loss	Dressing loss
	Dressing percentage	Dressing percentage
	Break even cost	Break even cost
	Break even cost per pound	Break even cost per pound
	Feeding margin	Feeding margin
	Feeding margin per pound	Feeding margin per pound
		Carcass breakeven cost
		Carcass profit margin per pound
		Performance ratio