Chapter 5
Hedging Outcomes with LGM Insurance

In this chapter, you will learn:
- how price changes affect gross margins;
- how to calculate the minimum expected margin and the net margin on livestock hedged with LGM under various market conditions; and
- some final considerations when purchasing LGM.

5.1 Introduction

Chapter 4 discussed how LGM basis margin differs from the futures basis producers realize in local markets and the basis margin risk associated with LGM. *Chapter 4* also illustrated when the EGM was most likely to be greater than the AGM and when indemnities were most likely to be paid based on historical prices. *Chapter 3* focused on the policies and provisions in LGM that users need to know to understand the program. Terminology and EGM calculations were the topics of *Chapter 2*, and *Chapter 1* provided a basic understanding of LGM. *Chapter 5* will use all this information to demonstrate two hedging outcomes under different market conditions and provide a discussion surrounding commodity price moves and their effect on gross margins and indemnities.

5.2 Changes in Gross Margin

As discussed in previous chapters, LGM Insurance for Cattle and Swine is designed to protect the feeding or finishing margins in a number of different operations. The cattle feeding margin is affected by the corn and feeder cattle input prices and the fed cattle selling price. The swine finishing margin is determined by the prices of soybean meal and corn as well as the swine selling price. Recall also that indemnities are paid to producers when the gross margin narrows as a result of price movements in the respective commodity markets such that the GMG is greater than the total AGM. The gross feeding or finishing margin can increase or decrease depending on which commodity's price increases, decreases, or remains unchanged. For example, the cattle feeding margin will increase if the fed cattle selling price increases and the feeder cattle and corn prices decrease. However, the gross margin may also increase if the fed cattle selling price increases and the feeder cattle and corn prices do not change. So, the gross margin is also affected by the size of the price changes relative to the other two commodities. For instance, if the fed cattle selling price decreases but the decrease is offset by a larger decrease in either the feeder cattle or corn prices (or both), the gross margin may still increase. *Figure 5.1* summarizes the effects these commodity prices have on the gross margin. The up arrow (↑) indicates a price increase while the down arrow (↓) indicates a price decrease. The horizontal arrow (↔) represents a constant price. Note that not all possible combinations of price moves are included in *Figure 5.1*, because the gross margin is based on the price move of one commodity relative to the other two that are hedged with LGM.

5.3 Hedging Outcomes

Understanding how the gross margin is affected by price moves in the underlying commodities is important. It is also important to understand how to calculate a minimum expected margin and a total net margin received with LGM under different prices.

Tables 5.1 and *5.2* present an organized format that can be used to keep track of important transactions and prices when using LGM insurance. Producers can use these tables to track all of their transactions associated with a particular target marketing month. The rows included in the table represent the dates the applicable feeder cattle, corn, and live cattle transactions take place in the cash market and for LGM. The relevant dates include when LGM insurance is purchased, when feeder cattle are purchased, when corn is purchased, the fed cattle selling date, and the date the insurance period ends. The columns represent the markets where these transactions take place, including the difference between the cash market and the LGM price (i.e., the LGM basis margin). Remember that although a yearling operation is used in all of the following examples, the concepts are similar for LGM for Cattle's calf finishing operation and the farrow to finish, feeder pig finishing, and SEW pig finishing operations included in LGM for Swine.

Suppose on Jan. 31, 2006 a cattle feeder purchased LGM for Cattle Insurance for a yearling finishing operation and specified target marketings only for August 2006. (It is important to note that the following calculations are presented on a per head basis for ease of comparison, but the example is easily extended to multiple head insured.) Thus, this example assumes only one head insured. On Jan. 31, the producer learns that the EGM for August target marketings is $85.13/head using RMA's online calculator (*Section 2.3* and *2.5*) The feeder also decides on a $0 per head deductible, so the GMG is also $85.13/head. The calculations associated with the LGM adjusted live cattle, feeder cattle, and corn prices used to

Gross Margin Increases			Gross Margin Decreases		
Fed Cattle	***Feeder Cattle***	***Corn***	***Fed Cattle***	***Feeder Cattle***	***Corn***
Swine	***Soybean Meal***	***Corn***	***Swine***	***Soybean Meal***	***Corn***
↑	↓	↓	↓	↑	↑
↑	↓	↔	↓	↑	↔
↑	↔	↓	↓	↔	↑
↑	↔	↔	↓	↔	↔
↔	↓	↓	↔	↑	↑
↔	↔	↓	↔	↔	↑
↔	↓	↔	↔	↑	↔
Large ↑	Small ↑	Small ↑	Large ↓	Small ↓	Small ↓
Small ↓	Large ↓	Large ↓	Small ↑	Large ↑	Large ↑

Figure 5.1. Changes in the Gross Margin Due to Commodity Price Changes.

determine the EGM and GMG are explained in detail in *Section 2.4.* Remember that these prices in the first row of *Table 5.1* are adjusted for the historical LGM basis as explained in *Section 2.4.* Realize, though, that these are not the prices the feeder will realize in the corn, feeder cattle, and live cattle cash markets. So, another basis (LGM basis margin) exists — the difference between actual cash prices and the LGM adjusted futures prices.

On Jan. 31, note that the producer takes no action in the cash market, but does determine an expected LGM basis margin for live cattle, feeder cattle, and corn for those transactions that will take place at a later date. These expected LGM basis margin figures are based on historical differences between the feeder's cash price and the LGM adjusted futures price. So, on Jan. 31, 2006 the expected live cattle, feeder cattle, and corn LGM basis margin are $1.83/cwt, $1.00/cwt, and $0.09/bu, respectively. According to LGM for Cattle rules, an August target marketing month means that feeder cattle will be purchased in March (*t-5*) and corn in June (*t-2*) while live cattle will be marketed in August (see *Equation 2.1*). March and June are only expected input purchase months (according to LGM policy regulations), and most operations will vary from these expected dates. Note that the expected basis margin is a prediction made for the commodity's respective purchase/sell date. For example, the expected live cattle basis margin is for Aug. 31 (the month cattle will be marketed).

The expected LGM basis margin of $10.20/head (in the LGM Basis Margin box for 1/31/06) is calculated by inserting each commodity's expected LGM basis margin in place of the commodity's price in *Equation 2.1* (be sure to use the appropriate equation for a calf operation or any of the three swine operations). So, with the hedge initiated by purchasing LGM with the GMG of $85.13/head, the minimum expected margin (MEM) the producer can expect to receive can be determined by adding the expected LGM basis margin to the GMG. Thus, the MEM is $95.33/head ($85.13/head + $10.20/head = $95.33/head). In other words, the feeder expects to net a margin of at least $95.33/head (note this is before paying the premium). If the actual LGM basis margin turns out to be different than the expected LGM basis margin, the net margin actually realized will be higher or lower.

Suppose the cattle feeder purchased 750 lb yearlings on March 31, 2006 (as is assumed in the LGM policy) at a cash price of $121.07/cwt (note that these are not real prices for that date, but are used for the example). Then suppose that on June 30, 2006 the cattle feeder buys corn for $2.15/bu in the cash market and sells the live cattle on Aug. 31, 2006 for $81.27/cwt in the cash market. No action is taken with LGM insurance on the feeder cattle and corn purchase dates and the live cattle selling date. The difference between the feeder cattle, corn, and live cattle prices in the cash market and the LGM adjusted futures prices (realized after August) is the actual LGM ba-

sis margin for feeder cattle, corn, and live cattle reported in the last column of *Table 5.1.* Note here that the actual feeder cattle LGM basis margin was $2.82/cwt, $1.82/cwt stronger than expected. This results in a smaller feeding margin. Conversely, the actual corn LGM basis margin was -$0.32/bu, $0.41/bu weaker than expected on Jan. 31, 2006. This results in a lower than expected corn price and a larger feeding margin. The actual live cattle LGM basis margin in August was $4.56/cwt weaker than expected, leading to a smaller feeding margin.

The cash gross margin, after the fed cattle are sold, is found by inserting the cash prices for the commodities into *Equation 2.7.* The cash gross margin of -$15.775/head is the margin the producer realizes in the cash market without using LGM insurance (*Table 5.1*). In this particular example, the adjusted live cattle price decreased $1.52/cwt to $84.00/cwt, the feeder cattle price increased $3.55/cwt to $118.25/cwt, and the corn price also increased $0.32/bu to $2.47/bu. Thus, the AGM for these August marketings was $21.10/head (*Equation 2.7*). Again, please note that the LGM adjusted futures prices comprising the AGM in *Table 5.1* and this example were hypothetical to show when an indemnity is paid. The adjusted futures prices that actually occurred are in *Equation 2.7* and follow in *Table 5.2.*

Because in this example the AGM is lower than the GMG, an indemnity of $64.03/head is paid ($85.13/head - $21.10/head = $64.03/head). The net margin the feeder realizes is $48.255/head. This is the cash margin plus the indemnity (-$15.775/head + $64.03/head = $48.255/head). If the producer did not have the LGM insurance, the net margin received would have simply been the cash margin, or -$15.775/head. Here, the producer's net margin is improved by the amount of the insurance indemnity ($64.03/head). However, the net margin the feeder receives, $48.255/head, is $47.075/head less than the minimum expected margin insured ($95.33/head). This difference is not due to how LGM performed, but rather the changes in the LGM basis margin. Note that the actual LGM basis margin (-$36.875/head) declined $47.075/head from the expected LGM basis margin. This difference is equal to the difference between the net margin and the MEM. (Had the actual and expected LGM basis margins been equal, the net margin would equal the MEM.) *Table 5.1* illustrates this particular hedging outcome when feeder cattle and corn prices increase and the live cattle price decreases.

Table 5.2 is similar to *Table 5.1*; however, *Table 5.2* shows the LGM adjusted live cattle, feeder cattle, and corn prices that were actually realized in 2006. Notice that the feeder cattle price decreased from January 2006 through the end of the insurance period. The LGM adjusted live cattle price increased to $90.73/cwt. Both resulted in the margin improving. However, the LGM

Table 5.1. Hedging Outcome with Feeder Cattle (FC) and Corn (C) Prices Increasing and Live Cattle (LC) Price Decreasing.

Date	Cash	LGM Insurance	LGM Basis Margin
1/31/06	No Action	Buy LGM Insurance Adj. LC Price = $85.52/cwt Adj. FC Price = $114.70/cwt Adj. C Price = $2.15/bu **GMG = $85.13/hd** (Deductible = $0/hd)	Exp. 8/31 LC Basis = $1.83/cwt Exp. 3/31 FC Basis = $1.00/cwt Exp. 6/30 C Basis = $0.09/bu Exp. Basis Margin = $10.20/hd
3/31/06	Buy FC @ $121.07/cwt	No Action	Act. 3/31 FC Basis = $2.82/cwt
6/30/06	Buy C @ $2.15/bu	No Action	Act. 6/30 C Basis = -$0.32/bu
8/31/06	Sell LC @ $81.27/cwt	No Action	Act. 8/31 LC Basis = -$2.73/cwt
12/31/06	Cash GM = -$15.775/hd	Adj. LC Price = $84.00/cwt Adj. FC Price = $118.25/cwt Adj. C Price = $2.47/bu **AGM = $21.10/hd** $64.03/hd Indemnity GMG>AGM	Act. Basis Margin = -$36.875/hd Exp. Basis Margin = $10.20/hd Difference = -$47.075/hd

adjusted corn price increased $0.11/bu, which lowers the margin. Thus, the AGM at the end of the insurance period was $192.83/head (*Table 5.2*). As before, the feeder's minimum expected margin of $95.33/head is equal to the expected LGM basis margin plus the GMG. The cash purchase prices for feeder cattle and corn actually realized in the cash markets are equal to their respective LGM adjusted prices, plus the actual LGM basis margin for March feeder cattle and June corn respectively. The live cattle cash sale price is also calculated by adding the adjusted LGM live cattle price plus the actual LGM live cattle basis margin for Aug. 31, 2006. The feeder cattle cash price ($111.00/cwt), corn cash price ($1.94/bu), and the live cattle cash price ($88.00/cwt) inserted into *Equation* 2.7 are used to determine the cash gross margin of $155.95/head, the margin the feeder receives without LGM insurance. Because the live cattle price increase and the feeder cattle price decrease were enough to offset the corn price increase, the AGM of $192.83/head is greater than the GMG; therefore, no indemnity is paid (note the AGM here was the same as calculated in *Equation 2.7* in *Section 2.4*). The expected and actual LGM basis margin were the same as in the previous example, so the expected basis margin is equal to $10.20/head and the actual basis margin is -$36.875/head, yielding a difference in the LGM basis margins of -$47.075/head.

The feeder's net margin in the example in *Table 5.2* is equal to the cash margin of $155.95/head and the indemnity, which was $0.00/head because the AGM exceeded the GMG. In this case, having the insurance did not improve the feeder's net margin; in fact, having the insurance protection would have lowered the margin by the amount of premium paid for the coverage. The difference between the net margin and minimum expected margin in this example is not attributable exclusively to basis margin changes, as was the case in *Table 5.1.* In this scenario, the difference between the net margin and minimum expected margin ($155.95/head - $95.33/head = $60.62/head) is equal to the difference between the AGM and the GMG, plus the difference between the actual and expected LGM basis margins ($192.83/head - $85.13/head + -$47.075/head = $60.62/head). In the first hedging example, the difference between the net margin and minimum expected margin was due to the change between the actual and expected LGM basis margins. In this example, the difference between the net margin and minimum expected margin is due to the change between the actual and expected LGM basis margins plus the change between the AGM and the GMG (which represents the margin increase). The net margin is $60.62/head higher than the minimum expected margin. This is a desirable outcome; the net margin turned out better

Table 5.2. Hedging Outcome with Feeder Cattle (FC) Price Decreasing and Corn (C) and Live Cattle (LC) Prices Increasing.

Date	Cash	LGM Insurance	LGM Basis
1/31/06	No Action	Buy LGM Insurance Adj. LC Price = $85.52/cwt Adj. FC Price = $114.70/cwt Adj. C Price = $2.15/bu **GMG = $85.13/hd** (Deductible = $0/hd)	Exp. 8/31 LC Basis = $1.83/cwt Exp. 3/31 FC Basis = $1.00/cwt Exp. 6/30 C Basis = $0.09/bu Exp. Basis Margin = $10.20/hd
3/31/06	Buy FC @ $111.00/cwt	No Action	Act. 3/31 FC Basis = $2.82/cwt
6/30/06	Buy C @ $1.94/bu	No Action	Act. 6/30 C Basis = -$0.32/bu
8/31/06	Sell LC @ $88.00/cwt	No Action	Act. 8/31 LC Basis = -$2.73/cwt
12/31/06	Cash GM = $155.95/hd	Adj. LC Price = $90.73/cwt Adj. FC Price = $108.18/cwt Adj. C Price = $2.26/bu **AGM = $192.83/hd** $0/hd Indemnity GMG<AGM	Act. Basis Margin = -$36.875/hd Exp. Basis Margin = $10.20/hd Difference = -$47.075/hd

than expected because live cattle and feeder cattle prices moved in the feeder's favor. Remember, that if an indemnity was paid (like in the first example) only the minimum expected margin would be realized (or something less as when the LGM basis margin weakens).

To summarize, the feeder receives a higher net margin when no indemnity is paid. This is because an indemnity is paid only to bring the margin up to the GMG (the minimum expected margin level before LGM basis margin adjustments) when the total AGM decreases below a specified point. However, a higher total AGM that does not trigger an indemnity payment usually translates into a higher net margin. For example, in *Table 5.1*, when an indemnity is paid, the net margin is $48.255/head, while in *Table 5.2* no indemnity is paid and the net margin is $155.95/head. It is also important to note that these examples show net margins before premiums for LGM insurance have been subtracted. Inclusion of premiums will lower the minimum expected margin and net margin but will not affect the differential between the two.

5.4 Final Considerations

Before deciding to purchase LGM insurance, a few limitations of the program must be considered. *Section 1.6* explains when LGM for Cattle and Swine is available for sale. Under certain circumstances, LGM may not be available at those specified times. LGM will not be available for sale if the CME lean hog or live cattle futures contract prices decrease by their daily limit for two consecutive days when the EGM is being determined. If one of the input commodity's futures price (corn and feeder cattle or corn and soybean meal) increases by their respective limits for two consecutive days while the EGM is calculated, LGM will be unavailable.

LGM sales can be suspended if a news report, announcement, or other event occurs during or after trading hours that is believed by the Secretary of Agriculture or RMA staff to significantly change market conditions from those on which LGM insurance for that day is rated. This is designed to prevent adverse selection by preventing producers from purchasing LGM with prior knowledge of how market prices are likely to trade the following day. Also, LGM sales may be stopped for a period of time if there is not enough underwriting capacity available.

5.5 Conclusion

LGM insurance is a program that may be useful to livestock producers wishing to establish a minimum feeding margin for their livestock. For producers with smaller herds who may not be able to use futures or options contracts, the flexibility of LGM may be especially beneficial. As an insurance product, LGM may be attractive to producers who may not understand or may not be comfortable trading in the futures or options markets. The program has other advantages over futures and options hedging. Once LGM is priced for a given day, the prices are guaranteed and will not change for that day. Also, LGM is available after normal market trading hours, allowing producers to purchase price coverage at times previously unavailable. LGM does not completely eliminate basis risk. Producers using LGM must be aware of their exposure to basis risk. Additionally, once a hedge is established with LGM, it cannot be lifted or sold back to recapture some of the premium cost. Although livestock does not have to be sold during the target marketing month, marketing the livestock before or after the specified month exposes the policy holder to price risk. Similarly, not purchasing the commodity inputs at the same time when LGM insurance values them can expose users to temporal price risk. Futures and options can be used simultaneously with LGM; however, there are restrictions on using LGM and LRP coverage on the same livestock at the same time. This may limit some producers' marketing strategies. All these factors are important to consider when evaluating LGM as a hedging tool.