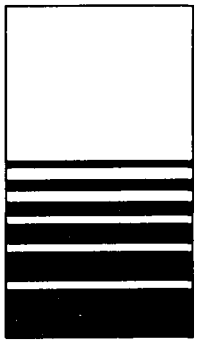
$4.25



BUSINESS MANAGEMENT IN AGRICULTURE

A joint project of the Cooperative Extension Service, Farm Credit and Chicago Mercantile Exchange

Using agricultural options

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Using agricultural options

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Carl O'Connor is a professor of agricultural and resource economics and Extension marketing specialist at Oregon State University. He is a consultant of educational programs to the Chicago Board of Trade, the Chicago Mercantile Exchange, and Farm Credit Services, St. Paul, Minn.

O'Connor has authored more than 200 articles published in the popular press dealing with livestock marketing, including hedging and the use of options, and appears regularly on radio and television. He is a former assistant professor at Iowa State University, and holds a Ph.D. in agricultural economics from Oregon State University.

Kim B. Anderson is an associate professor and Extension grain marketing specialist at Oklahoma State University. He writes a biweekly column on grain marketing for the *Southwest Farm Press*, has a weekly radio program broadcast over 48 stations, and appears on televised agricultural programs several times a year to share his expertise in grain and livestock marketing.

Anderson has written more than 200 articles for the popular press, academic journals, and Extension publications on grain and livestock marketing and risk management. He is a former assistant professor at the University of Kentucky. Anderson holds a Ph.D. in agricultural economics from Oklahoma State University.

Jim Graham is Director of Commodity Marketing and Education at the Chicago Mercantile Exchange. He is in charge of educational programs for cattle growers and feeders, commercial users of meat, and lumber organizations. His department sponsors about 85 hedge programs annually and he has held this post since July 1987.

Graham is a graduate of the University of Wisconsin-Madison with a master's in agricultural economics. He started with the CME in 1980 in the research department as an analyst and moved to the marketing and education department in 1982 as marketing specialist.

Purpose

The purpose of this module is to help you:

1. gain an understanding and working knowledge of a new vocabulary—options, futures option contracts, puts, calls, synthetic puts and calls, windows, and fences;
2. understand how to use options as a marketing tool to set minimum prices for the commodities you sell, set maximum prices for purchasing inputs, hedge using options contracts, and convert fixed price positions (forward contracts and hedges) into flexible price positions; and
3. understand the concept of synthetic puts and calls, windows, and fences and how to use them in managing price risk.

Videotape script

By Carl O'Connor, Kim Anderson and Jim Graham

Fred— Hi! I'm Fred Steward. Today we are going to explore a marketing alternative that many farmers, ranchers and lenders may not be too familiar with—futures option contracts. We will start by defining an option, a futures option contract and other associated terms. Then we'll continue by looking at some of the uses of futures option contracts. For example, we'll include setting minimum prices, setting maximum prices, hedging with option contracts, converting forward contracts or futures hedges to minimum price positions, and setting windows or fences.

Joining me today from Oklahoma State University is Dr. Kim Anderson. Glad to have you join us, Kim.

Kim— Glad to be with you, Fred.

Fred— Let's get started with a very basic question: What is a futures option contract?

Kim— According to *The World Book Dictionary*, an option is defined as the right to buy or sell something at a certain price within a certain time. A futures option contract provides the right of choice for the agricultural producer.

Fred— How do you obtain this "right of choice" or the right to choose?

Kim— Normally, right of choice has to be purchased. In other words, someone sells you the right. The seller of an option contract gives up the right of choice. In return, the seller is paid a premium. The size of the premium will

FUTURES OPTION CONTRACT

The right to buy or sell something at a certain price within a certain time.

- The buyer purchases the right of choice
- The seller trades or transfers the right of choice for a premium

PUT OPTION

Puts are for people who "put commodities on the market"

CALL OPTION

Calls are for people who "call commodities off the market"

depend on the risk associated with giving up the right of choice.

Fred— So, futures option contracts are bought and sold.

Kim— That's right. Agricultural futures option contracts may be bought or sold in either of two markets: the *put* market or the *call* market.

Fred— Then the next question has to be, What is the difference between a put option and a call option?

Defining put and call options

Kim— The put option is for people or producers who p*ut commodities on the market*, in other words, *sellers* of commodities. The call option is for people who *call commodities off the market*, or *buyers* of commodities.

An important point here is that put option contracts and call option contracts are bought and sold on separate markets.

Fred— Does a put option contract offset a call option contract?

Kim— No. If I were to *buy* a put option contract, I would realize the value of that contract only by *selling* an identical put option contract or by *exercising* the contract. The same is true if I bought a call option contract. I would receive the value of the contract only by selling an identical call option contract or exercising the call.

Fred— So, if you buy a contract and later it has some value you want to receive, you either have to sell the contract or exercise it.

Kim— That's right.

Fred— Who buys option contracts?

Kim— Producers generally will be buyers of option contracts. And generally, sellers of option contracts are speculators.

Fred— I don't really understand why a producer would want to buy a put option contract.

Protecting against price decline

Kim— Most people don't. Put option contracts can be used to protect a producer against a price decline. Let's say you're a producer who will have 600-lb. feeder cattle for sale three months from now. You want to eliminate any downward price risk, but you also want to benefit from any price increase if one occurs.

Put option contracts protect producers against price declines

Fred— So?

Kim— So, you can purchase a put option which *gives you the right* to sell feeder cattle for, let's say, $70/cwt. three months from now. If in the three months the price has fallen to $65, you would certainly exercise your right to sell at $70. Wouldn't you?

Fred— Yes.

Kim— But you have another choice. You could sell the option to someone else for at least $5 more than you paid for the contract.

Fred— Okay, I see. But what if prices go up?

Kim— If feeder cattle advance to, let's say, $75, you would not exercise the right to sell at only $70.

Fred— No, I agree. But what would I do?

Kim— You would simply let the option expire and receive $75 for your feeder cattle in the cash market. You have taken advantage of any price increase while insuring against price losses.

Fred— Now that's something we can't do with a hedge.

Kim— That's right. This is one of the obvious and important advantages of options.

Fred— Who sells put option contracts?

Kim— Generally, they are sold by speculators.

Fred— What is their incentive?

Kim— Speculators are willing to accept the price risk, but only for a price, and that price is called the premium.

Fred— I understand why producers would buy a put to protect against price declines while taking advantage of price increases, but why would a producer purchase a call option contract?

Protecting against price increases

Kim— Call option contracts *protect* buyers from higher prices. A call option contract is bought by someone who uses agricultural commodities. If prices go up, the call option contract premium increases and the buyer of the call option contract ends up with a lower net price. If prices go down, the call option contract is allowed to expire, and the buyer simply purchases the commodity at the lower price on the cash market.

STOP 1

Call option contracts protect buyers from higher prices

Fred— There seems to be a lot of new terminology here I'm not familiar with. I think it would really help me, and

our audience, if we could get a better handle on some of these terms.

Kim— The option market does bring a new language with it. Dr. Carl O'Connor, a professor at Oregon State University, and I prepared a videotape that defines some of these terms.

Fred— Let's roll that tape now and see if that will help us.

Carl— Hi! I'm Carl O'Connor, and in this video segment Kim Anderson and I will introduce you to some of the language used in trading futures option contracts. We encourage you to use the written materials we have provided and to stop the tape as needed to think about each term. Let's begin by reviewing the definition of an option contract.

Option contracts

Kim— An agricultural futures option contract is defined as a contract that gives the contract buyer the right of choice to either buy or sell an underlying futures contract at a contracted price.

Carl— When you say "underlying futures contract," what do you mean?

Kim— The underlying futures contract is the futures contract specified by the option buyer. The buyer must specify the futures commodity and the commodity delivery month. For example, if corn is to be delivered in November, the underlying futures contract may be the Chicago Board of Trade (CBT) December corn contract. Or, if the commodity is live cattle, the feedlot operator may need to select the April put option, which has the Chicago Mercantile Exchange (CME) April live cattle contract as the underlying futures contract.

Carl— In the case of a futures *call* option contract, the buyer has the right to accept a buy position in the underlying futures contract at the contracted strike price. In the case of a futures *put* option contract, the buyer has the right to accept a sell position in the underlying futures contract at the contracted strike price.

Kim— *Strike price* is another new term.

Carl— That's correct. The strike price, sometimes called the exercise price, is the price at which the buyer has the right to accept the futures contract. The strike price is specified when the option contract is sold or bought.

CALL

Buyer can accept a *buy position* at the strike price

PUT

Buyer can accept a *sell position* at the strike price

Kim— If a put option contract is purchased, the buyer has the right to sell or exercise a futures contract at any time between the purchase date and the contract expiration date at the contract strike price.

Carl— And as you would suspect, a call option gives the buyer the right to buy or exercise a futures contract at the contract strike price at any time between the purchase date and the contract expiration date.

Kim— A buyer must pay the option contract seller for the right of choice. The amount paid is called the premium. So, the premium is the price paid for a put or call option contract.

Carl— An option contract buyer specifies the underlying futures contract and the strike price. A floor trader, in the appropriate exchange, auctions the option contract to the bidder that offers the best price. This best price is the premium paid by the buyer to the seller.

PUT

Purchaser can *sell* at the strike price

CALL

Purchaser can *buy* at the strike price

Intrinsic time value of options

Kim— Let's explore what affects these premiums.

Carl— Okay. The premium is affected by three factors: the intrinsic value, the time value, and the price volatility of the underlying futures contract. Intrinsic value is the difference between the strike price and the underlying futures contract price. Intrinsic value is the amount the strike price is *in-the-money*.

Kim— For a put option, an *in-the-money* strike price is a strike price that is above the underlying futures contract price. An *at-the-money* strike price is equal to the underlying futures contract price. And an *out-of-the-money* strike price is a strike price that is below the underlying futures contract price.

Carl— Let me make sure I have this. A put option contract gives the buyer the right to take a short, or sell, position in the underlying futures contract. A strike price above the futures contract would allow the put option holder to sell high and buy low, thus making money or, as you say, being in-the-money.

Kim— That's right. And if the strike price is less than the underlying futures price, the holder would not buy at a price below the selling price; thus, the option strike price is out-of-the money.

Carl— And the term at-the-money is used when the strike price is equal to the underlying futures price. The strike is at-the-money.

IN-THE-MONEY PUTS

Strike price > Futures price

AT-THE-MONEY PUTS

Strike price = Futures price

OUT-OF-THE-MONEY PUTS

Futures price > Strike price

IN-THE-MONEY CALLS

Futures price > Strike price

AT-THE-MONEY CALLS

Strike price = Futures price

OUT-OF-THE-MONEY CALLS

Strike price > Futures price

Kim— Now, let's switch gears. Since call option contracts give buyers the right to take a long (or buy) futures contract position, in-the-money strike prices are below the underlying futures contract price.

Carl— Right. At-the-money strike prices are equal to the underlying futures contract price. Out-of-the-money strike prices are above the underlying futures contract price.

Kim— At-the-money and out-of-the-money strike prices do not have intrinsic value.

Time value

Carl— That's correct; however, option contracts with strike prices at-the-money and out-of-the-money may have *time value*. Option sellers take a risk that the underlying futures contract price will move against their position. Plus, option sellers have the additional costs of maintaining a margin account for their option position. The further from the expiration date, the higher the risk and the larger the premium required. The premium amount above the intrinsic value is called time value.

Kim— Premiums are higher for strike prices in-the-money than for strike prices at-the-money or out-of-the-money. And premiums are higher for option contracts further from expiration.

Carl— Premiums are also higher if the underlying commodity cash- and futures-contract price is volatile. The more volatile the price, the higher the risk that the price will move against the seller. Thus, the seller will demand a higher price, or premium, to cover the increased risk.

Kim— One last thing. It seems we should say something about the range of strike prices at any one time.

Carl— First of all, strike prices will always be in $2/cwt. increments for livestock, $0.10/bu. increments for corn and wheat, and $0.25 increments for soybeans.

Kim— For example, live hog options may range from $38, $40, $42, $44 up to $48/cwt. and corn may be $2.50, $2.60 on up to $3.00/bu.

Carl— And second, the range will depend primarily on the potential volatility of the commodity. During the life of the options contract, there needs to be some chance that prices will move to the strike price. The more volatile the price, the more strike prices there are or the bigger the range of strike prices trading on the market.

EXPECT HIGHER PREMIUMS WHEN:

- Strike prices are in-the-money
- Expiration dates are far away
- Underlying commodity cash/futures prices are volatile

Fred— That was pretty tough stuff. I hope you are aware that you are not expected to have all these terms memorized. I hope, as we keep using these words throughout this module, the terms will become more and more familiar to you and may even become part of your everyday vocabulary. This is a good place to stop and complete some exercises that use these terms. We'll rejoin you in a few minutes.

STOP 3

(pause)

Determining option premiums

Fred— We now know that futures option contracts are for underlying futures contracts. How are the option premiums determined?

Kim— Competition determines the premium. Option contracts are bought and sold at auction to many buyers and many sellers. If a seller tries to obtain too high a premium, other sellers will offer a lower premium.

Fred— In other words, as long as there is a potential for profit, buyers and sellers will compete for the profit. The next question is, How does the option market interact with the futures market?

Margin accounts

Kim— This is a little more complicated. You will recall that in trading futures, participants must deposit a sum of money and maintain a margin account with their broker. This is to ensure that adequate funds are available on a day-to-day basis to cover losses that might be incurred in the futures position.

Fred— Are you about to say that options are different?

Kim— Yes. The situation is a bit different, at least for option buyers. Since the most an option buyer can possibly lose is the option premium, this is the most the buyer will ever have to deposit with his broker. This premium goes to the option seller.

Fred— How about option sellers?

Kim— Option sellers face the same risks as participants in the futures market. For example, if you have sold a call, you will be assigned a short futures position if the buyer chooses to exercise the option. Your risk is the same as someone who has a short futures position. The only difference is that, as the seller of an option, you have

OPTION BUYERS

- Can lose only the option premium

OPTION SELLERS

- Take price risk
- Must maintain margin accounts

OPTION BUYER MUST:

- Exercise contract
- Offset—sell a like contract
- Let contract expire

OPTION SELLER MUST:

- Deliver underlying futures contract
- Offset—buy a like contract
- Do nothing; keep the premium

received the option premium. The important thing to remember is sellers of options must deposit and maintain adequate funds in a margin account to cover potential losses on a day-to-day basis.

Fred— Help me understand. Could you review the alternatives of both option buyers and sellers?

Exercising alternatives

Kim— A buyer of a put or call option contract may exercise the contract, offset by selling an exact contract, or let the contract expire. A seller of a put or call option contract may be required to deliver the underlying futures contract. He may offset the option position. Or, if the price moves in favor of the seller, the seller may not be required to do anything. In this case, the seller simply would keep the premium.

Fred— You used the word "offset" a couple of times. Would you explain what you mean?

Kim— Both the buyer and seller have the right to offset the option contract. A contract position is offset by buying (in the case of the seller) or by selling (in the case of the buyer) an identical option contract.

Fred— Can you show me an example?

Kim— Sure. Assume that you have bought a $66/cwt. CME March feeder cattle put option contract for a premium of $3.50/cwt. You may offset the position by selling an identical option contract—a $66 Chicago Mercantile Exchange March feeder cattle put option contract—for $4.50. The profit, in this case $1, would be determined by subtracting the purchase premium of $3.50 from the sell premium of $4.50. An important point to remember is that the option must be exercised or offset before the contract expiration date.

Fred— Who sets the expiration date?

Expiration dates

Kim— The option contract expiration date is set by each commodity exchange. Most agricultural commodity option contracts expire before the first delivery date of the underlying contract.

Fred— You say most. Are there exceptions?

Kim— Yes. One exception is the Chicago Mercantile Exchange feeder cattle contract. Since the feeder cattle

futures contract has cash settlement rather than physical delivery, the option contract expires the same day as the underlying futures contract.

Fred— Where can I get the latest information on option contract specifications including expiration dates?

Kim— It's best to ask your broker for the latest specifications.

Fred— Kim has introduced futures option contracts and the following terms: underlying contract, strike price, premium, offset, exercise, expiration date, in-the-money, at-the-money, out-of-the-money, intrinsic value, time value, and price volatility. We encourage you to stop the tape and review these definitions. Then please rejoin us as we explain the mechanics of using futures option contracts.

STOP 4

(pause)

Using agricultural options

Fred— In this segment, Dr. O'Connor will join me directly from Oregon State University to explain the price effect of buying and selling option contracts.

The option positions we will discuss are sellers buying put option contracts or selling call option contracts; buyers purchasing call option contracts; and speculators selling puts and calls.

Welcome, Carl. Can you set up a situation to illustrate these option positions?

Carl— Sure. I appreciate the opportunity to join in. I'd like to start with a livestock example. Let's say you're a rancher who is producing 700-lb. steers which you will sell in lots of 65 head to a feedlot. This would correspond to about 44,000 lbs., or one Chicago Mercantile Exchange feeder cattle contract.

Setting a minimum price

Carl— Let's start out by setting a minimum selling price for your feeder steers. Remember, you are going to "put the steers on the market," so you are going to want to evaluate using a put option to establish that minimum price.

The next steps are to establish the strike price and determine the basis and premium, brokerage, and interest costs. Let's say that as the producer you buy a Chicago Mercantile Exchange feeder cattle $66/cwt. put option contract. Normally, you can expect a range of strike prices

SET A MINIMUM PRICE

1. Establish a strike price
2. Determine the premium
3. Estimate the basis
4. Determine fees and interest

SET A MINIMUM PRICE

Strike price	$66.00
Premium	–3.00
Basis	0
Fees/Interest	0
Minimum price	$63.00

for both puts and calls trading on any one day. But to keep our example simple, let's assume you are interested in a put with a $66 strike price. Further, we'll assume the premium is $3/cwt. for the $66 put.

Fred— What about the basis, fees and interest?

Carl— For simplicity, assume that the basis is zero, and, for now, we'll ignore the brokerage and interest costs. The minimum price, therefore, is $63. A zero basis means that you forecast the cash price and the futures price to be the same when you sell your steers. Ignoring the transaction costs over estimates the net price by about $0.30. It's important to remember that these two variables must be considered in each situation and will not be zero.

Fred— Okay. I am producing 700-lb. feeder steers. What are the price effects if I just use the cash market?

Carl— Using only the cash market creates a situation of *unlimited* potential gain and *unlimited* potential loss. The net price is the cash market price. If the cash price goes up, a higher net price is received. If the price goes down, a lower price is received.

Buying put options to set a minimum price

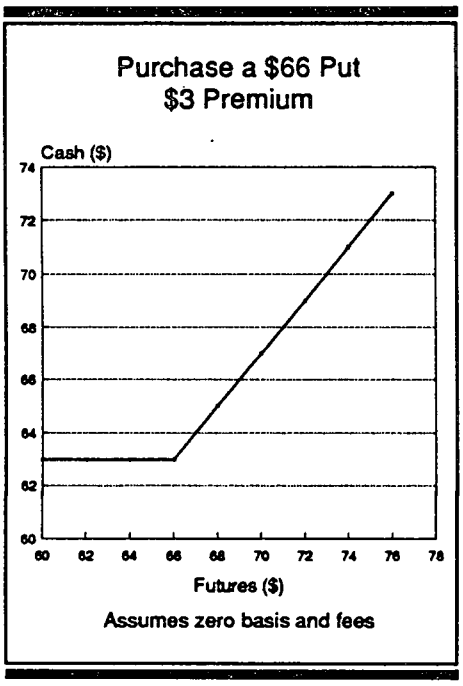
Fred— Now, how does a $66 feeder cattle put option contract change this situation?

Carl— If the cash price declines, two things happen. First the steers are sold at a lower price, and second the put option contract premium increases. I'm assuming that both the cash and futures declined and the intrinsic value of the put increased. In other words, the decline in the cash price is offset by the increased value of the $66 put option contract. The put option contract sets a price floor.

Fred— What is that price floor?

Carl— The price floor is the $66 strike price minus the $3 premium, or $63. Now, if the cash price is $60 and we assume a zero basis, the futures will also be $60. You sell the steers for $60 and the option contract premium will at least reflect the $6 intrinsic value of the $66 put. After subtracting the $3 premium paid from the $66 price, the net price is still at the price floor of $63. It's easy enough to show that at any price less than $66, the net will always be at the price floor of $63.

Fred— What happens if the cash price increases?



Carl— Again, two things happen. First, you sell the steers at the higher cash price, say $71. Second, as the cash price increases above $66, the $66 put option contract will have little if any value. The net price received will be the cash price of $71 minus the $3 premium paid, or $68. As the cash and futures prices increase above $66, the net price received increases dollar for dollar, adjusted for the premium. Producers that buy put option contracts establish an expected minimum price while maintaining the right to sell at higher prices.

A word of caution, though. Remember, we assumed that the basis is zero and that there are no fees and interest costs.

Fred— Now, the option contract is for the underlying CME feeder contract of 44,000 lbs., or 440 hundredweight. That's a lot of beef. What am I paying for each contract?

Carl— Each contract will cost $3/cwt. or $1,320. This is the $3 premium multiplied by the 440 hundredweight in the contract.

STOP 5

COST OF THE CONTRACT

Premium	$3.00
Contract size (440 cwt)	X 440
	$1,320

Selling call options by producers

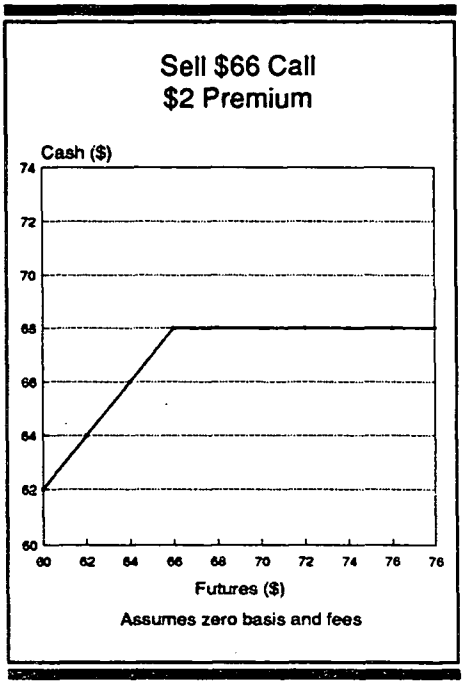
Fred— I think I have that. Now let's change the situation. What happens if I sell a feeder cattle $66/cwt. call option contract with a $2/cwt. premium?

Carl— You now find yourself in a very different situation. As cash and futures prices increase, call option premiums increase. Since you sold the call option, as prices increase above the strike price you lose. And you must meet margin calls on the short futures position just like a futures hedge. As prices increase, the result is that any loss from the $66 call option is offset by selling the steers at a higher price in the cash market. What you have done is establish a ceiling at the $66 strike price plus the $2 premium, or $68.

If prices decline, you lose in the cash market. The value of the call option also declines. In fact, the call option expires worthless. You keep the entire $2 premium. Thus, the net price will be the cash price plus the $2 option premium. However, the premium may only offset a portion of the cash market decline. A producer selling a call option has unlimited loss and limited gain.

Fred— It appears the price effect is just the opposite of buying a put option contract.

Carl— That's right. When a producer buys a put option contract, a price floor is established. When a producer sells a call option contract, a price ceiling is established. Selling option contracts is normally associated with speculating.



But, as we'll see a little later, selling option contracts may be used with other marketing tools to establish different marketing strategies.

STOP 6

Purchasing call options to set a maximum price

Fred— Carl, let's switch and assume I'm a feedlot manager. Can I use options to protect the price I'm going to pay for some of my inputs, such as feeder cattle or feed grains?

Carl— Sure. A feedlot manager buys feeder cattle and feed grains, in essence "calling them off the market." Therefore, you will buy a call option to protect the purchase price of these inputs. You can buy a CME feeder cattle call option contract, and you can purchase a Chicago Board of Trade corn call option. By purchasing these calls, you establish an expected maximum price for these inputs.

Fred— Please show me an example.

Carl— Okay. Assume the CBT corn $2.80/bu. call option contract premium is $0.18/bu. The expected maximum price is the $2.80 strike price plus the $0.18 premium, or $2.98. Again, we're assuming zero basis, fees and interest.

Fred— What if prices increase?

Purchasing calls by buyers

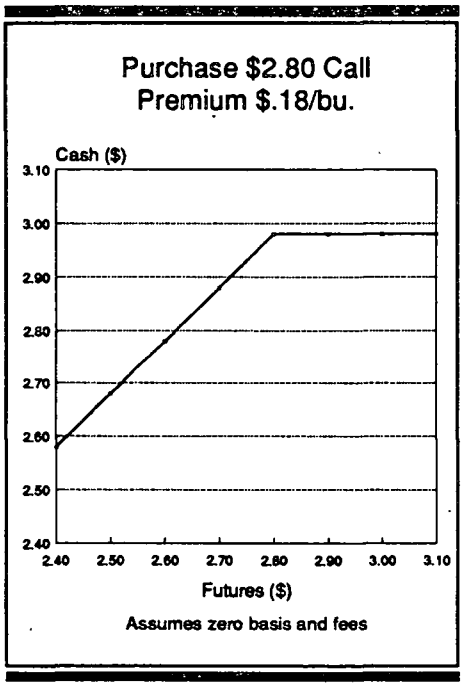
Carl— If corn prices increase, you will pay a higher price for the cash corn. But the premium for the $2.80 call option also increases. Again, in this example I'm assuming the cash and futures increase and the intrinsic value of the call increases. This increased premium offsets the higher price paid for the corn.

For example, if you pay $3 for the corn at a zero basis, the $2.80 call option premium will be at least $0.20—its intrinsic value. Thus, the net price will be $3 paid for the corn, plus the $0.18 premium paid for the call option, minus the $0.20 premium received from selling the call option for a net or maximum buying price of $2.98.

Fred— What if prices decline?

Carl— A price decline would allow the corn to be purchased at a lower price, such as $2.50, and the premium would have little or no value. The net price paid would be the cash price ($2.50) plus the $0.18 premium, or $2.68.

Fred— That's interesting. We often fail to work on the buying side of our profit ledger.



Carl— That's right. And buying call options may reduce risk to a manageable level and allow a producer to participate in an investment that may be too risky otherwise. Calls can have just as big an impact on the bottom line as using puts.

STOP 7

Fred— I think I have a general understanding of using puts and calls to establish relatively simple marketing strategies. But, I would like to know what the speculator gets out of the deal.

What the speculator gains

Carl— The most a speculator may gain from selling an option is the premium minus the brokerage and interest fees. For example, assume that you do not own nor are you going to buy feeder cattle. As a speculator, you sell a feeder cattle $66/cwt. put option contract for $3.50/cwt. If prices go above $66, the maximum you can gain is the $3.50 premium. At $62.50, your $3.50 premium will have eroded. And at prices below $62.50, you lose dollar for dollar.

Selling a call option contract produces the opposite effect. If you sell a feeder cattle $66 call for, say $3.50, and prices go down, you keep the $3.50 as profit. If prices go above $69.50, you lose dollar for dollar.

Also, sellers of option contracts do not receive the premium until the contract expires or the contract is offset. And remember, sellers must maintain margin accounts.

Fred— Buyers and sellers of agricultural commodities use many combinations of option contracts. We've explained how producers may establish an expected minimum price by buying a put option contract or a maximum price by selling a call option contract. Buyers of agricultural commodities may establish expected maximum prices by buying a call option contract. We'll provide several exercises to explore these market strategies in more detail. Please stop the tape now and join your facilitator in discussing these situations.

STOP 8

(pause)

Using options to establish price risk stategies

Fred— Welcome back. Let's go back to Carl on the West Coast. Carl, I'm feeling good in that I think I understand what an option contract is, the difference between puts and

calls, how to use puts to establish minimum prices, and how to use calls to establish maximum prices.

Carl— You're sounding more like an expert, Fred.

Fred— Flattery will get you everywhere, Carl. You mentioned earlier that option contracts may be used to establish other price risk strategies.

Carl— Yes. I would like to explore how to convert a hedged price or a forward contracted price to a floor or ceiling price. These actions are called establishing synthetic or artificial puts and calls.

Fred— That sounds interesting. Let's ask Jim Graham to join us from the Chicago Mercantile Exchange. Welcome, Jim.

Jim— Glad to join you.

Synthetic puts and calls

Carl— Jim, we want to discuss how to convert forward contracts and hedges into synthetic puts and calls. First, why would you want to convert a fixed-price position into a minimum-price or maximum-price position?

Jim— There are times that the market price changes direction. Producers who have established a fixed-price position with forward contracts or hedges may find it to their advantage to convert the fixed position into a flexible position.

Fred— I still need a more concrete example, Jim.

Jim— Okay, maybe a farmer wants to convert a forward contract to sell grain into a minimum price. Or, a feeder may want to convert a forward contract to buy grain into a maximum price. Option contracts will allow them to do that.

Fred— Are short and long hedges converted the same way as forward contracts?

Jim— Yes, they are. Short hedges may be converted to a price floor by buying a call option contract, and a long hedge may be converted to a price ceiling by buying a put option contract. Another way to convert a hedge to a floor or ceiling is to offset the futures position and buy a put or a call option contract. In this case, the producer needs to determine which costs the least—the option contract or the synthetic option contract.

Defining synthetic puts and calls

Carl— Just to clear up a couple of terms, What is a synthetic put?

Jim— A synthetic put is converting a forward sale contract or short hedge to a minimum price.

Carl— And converting a forward purchase contract or a long hedge to a price ceiling is called a synthetic call.

Jim— That's right. Synthetic puts and calls are a combination of marketing contracts that have the same price effect as purchasing a put or a call option contract.

Fred— I'm sure an example would help.

Jim— Okay. Assume you are a cattle producer and you bought 375-lb. steers to graze high protein pasture. You had forward contracted to sell the steers for first-half May delivery at $74/cwt. Shortly after signing the forward contract, the cash price of feeder cattle fell $4, and the Chicago Mercantile Exchange May feeder cattle contract fell to $68.

Fred— I'd be feeling good having sold before the market declined.

Jim— You'd be feeling great. But let's say this is a temporary move in the market and that independent market analysts are predicting that cattle prices should increase. That is, you feel the odds are about 75% in favor of it. You have already sold the steers for $74 on a market that is now offering $70 ($68 May contract price plus the expected $2 basis). The basis offered in the cash contract price is $2 over the May futures contract.

Carl— What I hear Jim saying is that you want to establish a minimum price. You have that with the forward contract, but you would also like to take advantage of a price rise if it occurs.

Fred— I see. I want to be in the same position as if I had a put. So what do I do?

Jim— One alternative is to buy a call option contract. You phone your broker and determine that the premium for an out-of-the-money $70 call option contract is $1.60. Fees and interest costs would be about $0.30 for a total cost of $1.90 ($1.60 + $0.30). Let's say that you buy the call. You have now established a synthetic put option contract. Your forward contract of $74, adjusted for the $1.90 in expenses, sets a minimum selling price at $72.10. The call will provide added revenue if prices increase.

Carl— What if prices do not go up?

SYNTHETIC PUT

Convert a forward contract or short (sell) hedge to a minimum price

SYNTHETIC CALL

Convert a forward contract or long (buy) hedge to a price ceiling

FLOOR PRICE CALCULATION

Cash contract price	$74.00
Call premium	−1.60
Fees/interest	−0.30
Minimum price	$72.10

IF FUTURES PRICES GO UP TO $76

Cash contract price	$74.00
Call premium	−1.60
Fees/interest	−0.30
Minimum price	$72.10
Intrinsic value of $70 call	$ 6.00
Net price	$78.10

HEDGE

"Short" futures	$72.40
Basis	+ 2.00
Fees/interest	−0.40
Hedge price	$74.00

Jim— If prices do not go up, your net price will be the $74 minus the $1.90 premium, fee, and interest costs. You have lowered the minimum price from the contracted $74 to $72.10. This is the lowest net price that you will receive—the same as having originally purchased a $74 put option contract for $1.90 rather than forward contracting for $74.

Carl— But, if prices go up?

Jim— If futures prices go above $70, you still deliver the feeders on the contract for $74 and pay the $1.90 premium. But, you also collect a premium for the $70 call option contract. Say the May futures price increases to $76. You deliver the cattle for $74. You paid the premium and costs of $1.90, which gives you that important minimum price of $72.10. Then you sell the $70 call option contract for at least $6 ($76 – $70)—its intrinsic value. You get a net price of $78.10 ($72.10 + $6).

Fred— Okay, I understand. But instead of forward contracting, What if I had hedged the feeders?

Hedging vs. forward contracting

Jim— If you had hedged the feeders for an expected price of $74 rather than forward contracting, the decision process would be different. Let's assume the expected basis is $2 over May. A $74 expected short-hedge price would imply that the May feeder cattle contract was sold for $72.40. Adding the $2 basis and subtracting a $0.40 fee and interest gives you the $74 short-hedge price.

Carl— Now, if you are hedged and the futures price falls to, say $68, what happens?

Jim— Remember, you established a hedged position of $74 by selling a May feeder contract for $72.40. If the futures price falls to $68, you will have a profit of ... let's see ... $4.40 in the hedge contract. You may buy the futures contract back for a $4.40 profit. Subtract $0.40 from a $4 net hedge gain and you can then buy a put option contract.

An at-the-money $68 put option contract could be purchased for $2.90 establishing a price floor of $71.10. The calculations for the price floor would be $68 strike price, minus premium and fees of $2.90, plus an expected basis of $2, plus the $4 profit from the futures contract, for a floor, or minimum selling, price of $71.10.

Fred— What would it cost to establish a synthetic put option contract?

Jim— A synthetic put could be established by maintaining the short hedge and buying a call. An out-of-the-money $74 call option contract could be purchased for $1.90. The established minimum price would be $72.10. This is the same as with the forward contract.

Carl— In this example, converting the hedge to a synthetic put is a safe way to convert a hedge price to a floor price and take advantage of any price increase.

Jim— You're right. But remember that margins must still be maintained on the futures contract. Margins are not required with the put option contracts. Therefore, some people prefer to offset the hedge and buy a put.

Fred— Can a person convert a long hedge into a synthetic call?

Converting long hedges to synthetic calls

Jim— Sure, a long hedge may be converted to a synthetic call by buying a put option contract. For example, assume you hedge 5,000 bu. of corn for $2.58/bu. But before you take delivery of the corn, the price increases to $2.80. For simplicity, let's assume a zero basis.

Carl— Again, Fred will feel good about making a good decision to hedge at $2.58.

Jim— Right. But let's say he also determines the odds of lower prices are about 80%.

Fred— So, I would like to set a maximum price (a ceiling), but still take advantage of a lower price if it occurs.

Jim— Exactly. So, to convert the forward contract to a synthetic call, you can buy a $2.70/bu. out-of-the-money put option contract. The premium costs $0.05/bu. or $250 per contract ($0.05/bu. X 5,000 bu./contract). Fees and interest costs are about $0.02. The $2.58 long hedge has now been converted to a price ceiling of $2.65 ($2.58 + $0.05 + $0.02).

Fred— What happens if the price remains above $2.65?

Jim— If the price of corn remains above $2.65, the higher price will be offset by the long hedge return. If prices fall below $2.65, the put premium increase will lower the net price.

MAXIMUM PRICE WITH A SYNTHETIC CALL

Cash contract price	$2.58
Put premium	–0.05
Fees/interest	–0.02
Maximum price	$2.65

Synthetic puts and calls involve some risk

Carl— Fred, synthetic puts and calls work. When you convert a fixed price to a synthetic put or call, you must realize that, to a certain degree, you are speculating. You speculate the option premium and transaction costs that the price will move in the expected direction and that the price will move enough to offset these costs. The most you could lose is the premium and transaction costs. The amount of speculation is limited. The potential gain, however, is not limited. Sometimes this is not a bad gamble.

Fred— Thanks to both of you—Jim and Carl. We have defined synthetic puts and calls. The mechanics for converting forward contracts or hedge positions to synthetic positions was also demonstrated. Please stop the videotape now for discussions and workbook exercises.

(pause)

Fred— Welcome back to our concluding video segment. Carl, you do not have to be around people who are using the futures market and options as pricing tools very long before you hear about windows.

Carl— That's right. Let's talk windows by joining Jim Graham at the Chicago Mercantile Exchange again. Jim, are you with us?

Jim— Sure am, Carl.

Carl— Jim, in relation to options, What is a window?

Using windows

Jim— A window is a marketing alternative that establishes both a price floor and a price ceiling. A producer who has a product to sell buys a put option contract and sells a call option contract. A buyer of agricultural commodities buys a call option contract and sells a put option contract. Sometimes you'll hear the term *fence* to describe this alternative.

Fred— Would you show us an example?

Jim— Sure. Assume you are a hog producer, and the June hog futures contract price is $56/cwt. The local basis is expected to be $2 under the June futures contract. If brokerage fees and interest costs are $0.40, you could hedge the hog production at $53.60.

Now, let's say an out-of-the-money $54 put option contract could be bought for a premium of $1.10 and $0.30 for brokerage fees and interest. An out-of-the-money $58 call option contract may be sold for $1.30 minus $0.30 for fees and interest. The net costs for the put and call options are calculated by subtracting the $1.30 call premium received from the $1.10 put premium paid and then accounting for the $0.60 ($0.30 + $0.30) in fees and interest costs. The net cost, therefore, would be $0.40, or $120 for a 30,000-lb. hog contract.

The window price may now be calculated by subtracting the window cost ($0.40) from the put strike price and the call strike price and subtracting the $2 under basis. A floor was established at $51.60 ($54 put strike price, minus $0.40 window costs and the $2 under basis). The price ceiling was established at $55.60 ($58 call strike price, minus $0.40 and the $2 under basis).

Carl— With both a price floor and ceiling, What if the price changes to below $54?

Price effects of windows

Jim— If June futures prices are below $54, the put option contract premium will be at least the amount that the price is below $54—its intrinsic value.

Let's say that the cash price is $46 and the futures contract price is $48. The hogs would be sold for $46. Adding the put option premium of at least $6 ($54 strike price minus $48 underlying futures contract price) and subtracting the $0.40 cost of the window, the net price would be $51.60. This was the established floor price, right?

Carl— And on the up side, What if the price is above $58?

Jim— If the price goes above $58, say to $60 on the cash market and $62 in the futures, the call option premium will be at least the intrinsic value of $4. Since you sold the call option, you must pay this amount ($4) plus the $0.40 cost. This creates a ceiling price of $55.60.

Carl— So, what you have done is set a price range—a window—with a minimum price of $51.60 and an upper price of $55.60.

Fred— But why would I do this? What are the advantages of this strategy?

Jim— The primary advantage of windows is that they may be established for less cost than simply buying a put

IF PRICES DROP

Cash price	$46.00
Option premium	+6.00
Window cost	− 0.40
Net price (floor)	$51.60

IF PRICES RISE

Cash price	$60.00
Option premium	− 4.00
Window cost	−0.40
Net price (ceiling)	$55.60

WINDOWS

Advantages

- Cheaper than buying a put or call

Disadvantages

- Don't receive premium until offset occurs
- Must maintain margin account

or call. In effect, the premium you receive from selling the call is used to *reduce* the cost of purchasing the put.

Fred— I see. But are there some disadvantages?

Jim— You do not receive the premium for selling the call until the transactions are offset. And, as you and Carl discussed earlier, you must maintain a margin account for the option contract you sold.

Carl— Jim, before we let you go, you just reminded me to ask about the issue of financing options in general. What should lenders and producers consider relative to financing options?

Jim— In general, my suggestion is that lenders follow the same guidelines they are now following in financing a hedge. Remember, if a put is exercised, you receive a short (or sell) position in the futures market. The lender, broker and producer should have a three-party agreement in place to facilitate the proper financing of this potential futures market position.

Carl— It seems that the prudent question is, Where is the collateral for this loan? or How does this position in options affect the collateral of the loan? This is the important question to ask and the one that will guide most financing decisions associated with options.

Jim— I'd agree to that.

Fred— Jim, your first window example was for sellers. Can buyers of agricultural commodities establish windows?

Buyers using windows

Jim— Buyers of agricultural commodities who have option contracts traded in the futures market can also establish price windows. This is normally accomplished by selling an out-of-the-money put option contract and buying an out-of-the-money call option contract. The width of the window is determined by the difference between call and put option strike prices.

Fred— Thanks, Jim. We've really appreciated your comments.

Jim— It was great, Fred. Nice to visit with you again, Carl. So long.

Carl— Fred, we've introduced a lot of market alternatives on this tape. A producer's marketing tool box needs to be bigger now that options have been introduced in agricultural marketing. But, just as we have emphasized through-

out this series, each of these management tools needs to be carefully evaluated. These tools, including options, need to become an integrated part of an overall farm management plan.

Fred— I agree. But before we close this session I want to thank both Kim Anderson and you for being with us

Carl— It was my pleasure, Fred.

Summary

Fred— As you can see, there are many option strategies you can use in forward pricing livestock and grains. Some strategies are very simple and have limited risk. Other strategies are more complex and require a high degree of option sophistication. Individuals using options for the first time may want to only hedge a portion of their inventory/production and then evaluate the results.

In addition to understanding the risks and rewards of a particular option strategy, a hedger still has to keep other factors in mind:

1. his own cost of production or storage;
2. the futures and options contract specifications;
3. the local basis, the relationship of cash to futures prices (Remember that some of the option contracts expire prior to the underlying futures delivery month.);
4. working with a knowledgeable broker and lender; and
5. having a specific marketing plan and goal.

Individuals who understand all the marketing and pricing tools available will certainly stand a better chance of having a profitable farming operation.

Hedgers must know:

- Cost of production or storage
- Contract specifications
- Local basis
- Knowledgeable broker and lender
- Marketing plan and goals

References

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Leuthold, Raymond M., J.C. Jenkins, and J.E. Cordier. 1989. *The Theory and Practice of Futures Markets*. Lexington, MA. Lexington Books.

Paul, A.B., R.G. Heifner, and J.D. Gordon. 1985. *Farmers' Use of Cash Forward Contracts, Futures Contracts, and Commodity Options*. Washington, D.C. U.S. Department of Agriculture, Economic Research Service, Agricultural Economics Report No. 533.

Each of the following organizations provide informational materials concerning futures, options, and related topics. For a brief description of these materials and an order form, write:

Chicago Board of Trade
Literature Services Department
LaSalle at Jackson
Chicago, IL 60604

Chicago Mercantile Exchange
Office Services Department
30 S. Wacker Drive
Chicago, IL 60606

National Futures Association
Public Affairs
P.O. Box 98383
Chicago, IL 60693

Commodity Futures Trading Commission
Office of Communication and Education Services
2033 K Street, N.W.
Washington, D.C. 20581

Appendix 1

Glossary

Actuals: The physical commodities.

American option: An option which may be exercised at any time prior to its expiration. All options presently traded on U.S. exchanges are American options.

Arbitrage: The simultaneous purchase and sale of securities, cash commodities, or futures at different prices in order to profit from a price discrepancy. Arbitrage generally involves no net investment by the arbitrageur, and once positions are established, the return is riskless and certain. Includes some aspects of hedging. (See Spread)

Asked: The price at which sellers will trade. This is usually accompanied by a bid, the price which buyers are willing to pay. The bid price is often a better indication of the true market level.

Assign: To designate an option writer for fulfillment of his or her obligation to sell a future (call option writer) or buy a future (put option writer).

At-the-money option: Call and put options are at-the-money when the price of the underlying futures is the same as the strike price.

Basis: The difference between a cash price at a specific location and the price of a particular futures contract.

Basis risk: The risk associated with unexpected changes in the basis between the time a hedge is placed and when it is lifted.

Bear (or bearish): One who believes or the belief that prices are too high and will decline. News is considered bearish if it is expected to depress prices.

Bear market: A downtrending market.

Bear spread: An option strategy that achieves maximum profit if the underlying future declines far enough and has its maximum risk if the future rises far enough. The strategy can be implemented with either puts or calls. In either case, an option with a higher striking price is purchased and one with a lower striking price is sold. Both options generally have the same expiration date.

Bid: An offer to purchase a commodity at a specified price.

Box spread: A type of option arbitrage in which both a bull spread and a bear spread are established for a riskless profit. One spread is established using put options and the other is established using calls. The spreads may both be debit spreads (call bull spread vs. put bear spread) or credit spreads (call bear spread vs. put bull spread).

Break: A sharp price movement. A market may *break upward* or *break downward*. The term is reserved by some for price declines.

Break-even point: The future price (or prices) at which a particular strategy neither makes nor loses money. A *dynamic* break-even point is one that changes as time passes.

Broker: One who executes the buy and sell orders for customers.

Brokerage firm: An exchange member that buys and sells futures contracts, or options, for customers for a fee.

Bucket: Illegal practice of accepting customer orders to buy or sell without executing such orders on an exchange.

Bulge: A large price rise.

Bull (or bullish): One who believes or the belief that prices are too low and will increase. News is considered bullish if it is expected to increase prices.

Bull market: An uptrending market.

Bull move: The term used by some chartists to indicate where daily highs, lows, and closes are higher than previous indications.

Bull spread: An option strategy that achieves its maximum profit if the underlying future rises far enough, and has its maximum risk if the future falls far enough. An option with a lower striking price is bought and one with a higher striking price is sold. Both generally having the same expiration date. Either puts or calls may be used for the strategy.

Butterfly spread: An option strategy with both limited risk and profit potential. It is constructed by combining a bull spread and a bear spread. Three striking prices are involved. The lower two are utilized in the bull spread and the higher two are utilized in the bear spread. The strategy can be established with either puts or calls; there are four different ways of combining options to construct the same basic position.

Buy in close: An order to buy within the closing price range at the end of a day's trading session.

Buy on opening: An order to buy within the opening price range at the beginning of a day's trading session.

Call option: A contract that gives the call option purchaser the right, but not the obligation, to buy a futures contract at a specific price during a specific time period. The call option seller is obligated to sell futures to the call option purhcaser if the call option purhcaser exercises his option.

Carrying cost: The interest expense on a debit balance created by establishing a position.

Cash market: (1) A market where physical commodities are bought and sold. (2) An organized, self-regulated cash market section of a commodity exchange. (3) A decentralized market in which buyers and sellers compete, possibly with the aid of an association.

Cash forward contract: A forward contract other than a futures contract or option.

CBOT: The Chicago Board of Trade. (Also CBT.)

Certificate of deposit: A short-term, fixed maturity obligation with a bank generally less than 270 days. Interest is paid at maturity.

CFTC: The Commodity Futures Trading Commission is the independent federal agency created by Congress to regulate commodity futures trading. The CFTC Act of 1974 became effective April 21, 1975. Previously, futures trading had been regulated by the Commodity Exchange Authority of the USDA.

Charting: Using graphs and charts to analyze past price behavior with the hope of forecasting future price movements. An essential part of technical analysis.

Class: A term used to refer to all put and call contracts on the same underlying future.

Clearinghouse: A separate agency that settles transactions made on the exchange trading floor. A clearinghouse reconciles differences and exchanges payments. Another key function of the clearinghouse is to guarantee financial integrity of all positions traded.

Closing price: Also known as range. The price or range during the period designated by an exchange as the official close.

CME: The Chicago Mercantile Exchange.

Combination: Any position involving both put and call options that is not a straddle.

Commission: The fee charged by a broker for services such as buying or selling commodities or options for a customer.

Commission house: Same as brokerage firm.

Confirmation: A document sent by the clearing commission firm to its client when a futures transaction is conducted—either purchase or

sale. It generally shows the date of the trade, delivery month, price and quantity.

Conversion arbitrage: A riskless transaction in which the arbitrageur buys the underlying future, buys a put, and sells a call. The options have the same terms.

Corner: (1) To corner is to secure such relative control of a commodity or security that its price can be manipulated, or (2) in the extreme situation, to obtain contracts requiring the delivery of commodities or securities exceeding the existing quantity of such commodities or securities.

Covered option: The seller of the option owns the underlying commodity itself or has a futures position.

Deferred futures: The futures, relative to those currently traded, that expire during the most distant months. (See Nearbys)

Delivery month: The calendar month in which a futures contract matures and contract settlement is required.

Delivery points: Those points designated by futures exchanges at which commodities may be delivered to satisfy a futures contract.

Delta: The amount by which an option's price will change with a corresponding change in price of the underlying future. Call options have positive deltas, and put options have negative deltas.

Delta neutral: The purchase (sale) of a varying number of put and call options in a straddle such that the value of the total straddle position is unaffected by changes in the underlying futures price.

Delta spread: A ratio spread that is established as a neutral position by utilizing the deltas of the options involved. The neutral ratio is determined by dividing the delta of the purchased option by the delta of the written option.

Discount: Indicating one price is below another price.

Early exercise (assignment): The exercise or assignment of an option contract before its expiration date.

Equivalent positions: Positions that have similar profit potential, when measured in dollars, but are constructed by differing means. Equivalent positions have the same profit graph. A covered call write is equivalent to an uncovered put write, for example.

Exercise: Refers to an option owner who purchases or sells the futures contract that the option had originally enabled him to purchase or sell.

European option: An option which may only be exercised on the expiration date.

Exercise price: Same as the strike price for listed options.

Expiration: The time at which an option no longer entitles its owner to purchase a specific futures contract.

Expiration date: The day when the owner of the option loses the right to exercise the option.

Extrinsic value: Same as time value.

Fair value: Normally, a term used to describe the worth of an option contract as determined by a mathematical model. Also sometimes used to indicate intrinsic value.

Fence: See Window.

Fill: To execute an order.

Floor broker: One who executes orders in the trading pit of an exchange.

Forward contract: An agreement between seller and buyer whereby the seller agrees to deliver a specific quantity and quality of commodity to the buyer at a specific time and location. When the seller delivers, he or she will receive a previously agreed upon price.

Forward selling: Forward contracting in which the price is fixed at the time the contract is entered.

Free on board (F.O.B.): Commodities delivered free of transportation charges.

Fundamentals: Those factors which affect the price of a commodity such as supply and demand, weather, political actions, etc.

Futures contract: A transferable, legally binding agreement to make or take delivery of a standardized amount of a commodity of standardized minimum quality grades during a specific month. The contract is subject to the terms and conditions established by the federally designated contract market on which trading is conducted.

Futures contract month: Any month futures contracts for a commodity are traded.

Futures type option: An option whose purchase requires no immediate cash outlay by the buyer. This type of option is settled in the same way as futures contracts; i.e., there is a daily cash settlement of each contract.

Grantor: See Option writer.

Hedge ratio: The mathematical quantity that is equal to the delta of an option. Establishment of a hedge ratio is useful because a theoretically riskless hedge can be established by taking offsetting positions in the underlying future and its call options.

Hedging: A position taken in a futures market opposite a position held in the cash market that minimizes the risk of financial loss from an adverse price change; a purchase or sale of futures as a temporary substitute for a cash transaction that will occur later.

Horizontal spread: An option strategy in which the options have the same striking price, but different expiration dates.

Implied volatility: A measure of the volatility of the underlying future. It is determined by using current prices rather than historical data on the price changes of the underlying future.

In-the-money option: A call option is in-the-money when the price of the underlying futures contract is above the strike price. A put option is in-the-money when the price of the underlying futures contract is below the strike price.

Intrinsic value: The value of an option if it were to expire immediately with the underlying future at its current price; the amount by which an option is in-the-money.

Inverse: A market where the nearby trading month contracts are worth more than those in later months.

Late tape: A lag in the reporting of futures market prices due to unusually heavy trading.

Leg: (1) A sizable price movement which is relatively uninterrupted by any corrections or reversals. (2) A risk-oriented method of establishing a two-sided position. Rather than entering into a simultaneous transaction to establish the position (a spread, for example), the trader first executes one side of the position hoping to execute the other side at a later time and a better price. The risk involved stems from the fact that a better price may never be available, in which case a worse price must eventually be accepted.

Leverage: (1) The ability to control a large amount of money with a small amount of funds. (2) In investments, the attainment of greater percentage profit and risk potential. A call holder has leverage with respect to a futures holder—the former can have greater percentage profits and losses than the latter for the same movements in the underlying future.

Life of contract: The entire time a contract is available for trade.

Limit (up or down): The maximum price advance or decline from the previous day's settlement price permitted in one trading session by the rules of the exchange.

Maintenance margin: The amount of margin of equity that must be on deposit at all time. When a customer's equity falls below maintenance level, a broker issues a margin call for an amount that will bring the equity back to the initial margin level.

Margin: The amount deposited by buyers and sellers of futures to insure performance on contract commitments; serves as a perform-

ance bond rather than a downpayment. Initial margin is the amount required when a futures position is opened.

Margin call: A request to either deposit the original margin at the time of the transaction or restore the guarantee to a required minimum level.

Market risk: The possibility of price decline for the owner of a commodity or producer and the possibility of price increase for a person who is required to purchase the commodity.

Mark-to-market: A daily cash flow system that calculates the gain or loss in each contract position, resulting from changes in the contract price at the end of each trading day, and adjusts the customer account accordingly.

Naked writing: Writing a call or a put on a futures contract in which the writer has no opposite cash or futures market position. This is also known as uncovered writing.

Nearbys: The nearest active trading month of a futures market.

Net position: The difference between the open contracts long and the open contracts short held in any one commodity.

Offer: Indicates willingness to sell at a given price. Opposite of bid.

Offset: The liquidation of a long or short futures (or option) position by an equal and opposite futures (or option) transaction.

Opening price: Official price at beginning of a trading day. Also known as range.

Opening transaction: A purchase or sale which establishes a new position.

Option: A right to buy or sell a designated futures contract at a specific price during the life of the option.

Option buyer or holder: A person who buys an option.

Option premium: The amount an option buyer pays the option writer for an option contract.

Options price curve: A graphical representation of the projected price of an option at a fixed point in time. It also reflects the amount of time value premium in the option of various futures prices. The curve is generated by using a mathematical model. The delta (or hedge ratio) is the slope of a tangent line to the curve at a fixed futures price.

Option writer or grantor: A person who sells an option contract, receives the premium, and bears the obligation to buy or sell the asset at the strike price.

Out-of-the-money option: A call option is out-of-the-money when the strike price is significantly above the current price of the underlying futures contract. A put option is out-of-the-money when the strike price is significantly below the current price of the underlying futures contract.

Overbought: A market situation in which prices are believed to have increased too far at too fast a pace.

Oversold: A market situation in which prices are believed to have declined too far at too fast a pace.

Overvalued: A future trading at a higher price than it logically should. It is normally associated with the results of option price predictions by mathematical models. If an option is trading in the market for a higher price than the market indicates, the option is said to be overvalued.

Par: The stated contract price as reported by the relevant commodity exchange. Various discounts and premiums may be applied to the Par price as stated in the relevant futures contract.

Point: The price unit in which futures prices are expressed.

Position: Describes the commitment of a buyer or seller.

Position limit: The maximum number of speculative futures contracts one can hold open under the rules of the CFTC or the exchange on which the contract is traded.

Premium: (1) The amount a given futures contract sells over another futures contract. (2) The additional payment an exchange allows for delivery of a higher-than-required-quality commodity against a futures contract. (3) The price an option buyer pays to an option seller for the right to buy or sell a futures contract at a specific price during the life of the option.

Price limit move: See Limit.

Privileges: An early form of agricultural options that is no longer traded.

Profit diagram: A graphic representation of the dollar value of an option in relation to the price of the futures at expiration.

Put option: A contract that gives a put option buyer the right, but not the obligation, to sell a futures contract at a specific price during a specified time period. The put option seller is obligated to buy futures from the put option buyer if the put option buyer exercises his or her option.

Quotations: The prices of futures, options or cash contracts for any given commodity or time. They are usually posted in daily newspapers, on TV, or on computer networks.

Rally: An upward movement of prices following a decline; opposite of a Reaction.

Range: The difference between the highest and lowest prices recorded during a trading session, week, month, life of contract, or any given period.

Ratio spread: Constructed with either puts or calls, the strategy consists of buying a certain amount of options and then selling a larger quantity of out-of-the-money options.

Ratio strategy: A strategy in which one has an unequal number of longs and shorts. Normally, it implies a preponderance of short options over either long options or long futures.

Ratio write: Buying a future and selling a preponderance of calls against the future that is owned. Occasionally constructed as shorting a future and selling puts.

Reaction: A decline in prices following an advance; opposite of a Rally.

Recovery: An upward correction of price following a downward trend.

Registered commodity representative (RCR): A person registered with an exchange and the Commodity Futures Trading Commission to trade commodities for customers.

Reportable positions: Fifty (50) or more puts or calls (bought or sold) in any contract month.

Reporting level: The number of futures contracts, as determined by the CFTC, above which one must report daily to the exchange and the CFTC with regard to the size of one's position by commodity, by delivery month, and by purpose of trading.

Resistance: A price zone above the current price level that has proven difficult for the market to penetrate. (See also Support.)

Retracement: A reversal of price direction for part of the distance of the original move.

Risk: The possibility of adverse outcomes associated with an action or business decision.

Seller: See Option writer.

Series: All option contracts on the same underlying future having the same striking price, expiration date, and unit of trading.

Speculator: One who attempts to anticipate price changes and, through market activities, makes profits; he or she is not using the futures market in connection with the production, processing, marketing or handling of a product.

Spread or straddle: In general, the purchase of one futures delivery month against the sale of another futures delivery month of the same commodity. A spread or straddle is the purchase of one delivery month of one commodity against the sale of the same delivery month of a different commodity; or the purchase of one commodity in one market

against the sale of that commodity in a different market. The purpose of a spread transaction is to take advantage of distortions in normal price relationships. There are several different types.

Spreader: One who is concerned with the shifting relationships between different delivery months for the same contract or different commodities over time.

Stock type option: An option whose purchase requires immediate and full payment by the buyer. Upon purchase the buyer has no further financial obligation.

Straddle: A strategy involving writing a put as well as a call on the same futures position. Both options carry the same strike price and expiration date.

Strike price: The price at which an option contract may be exercised.

Support: A price zone below the current price level which has proven difficult for the market to penetrate. (See also Resistance.)

Technical analysis: The study of charts and, more specifically, price movement to forecast commodity prices.

Technician: A trader who relies on price movement patterns to decide whether to buy or sell. He or she generally disregards supply and demand conditions.

Thin market: A low volume market in which a large trade unduly affects the market price.

Tick: See Point.

Time premium (value): The amount by which an option's total premium exceeds its intrinsic value. If an option has no intrinsic value, its premium is entirely time value.

Trend: The general direction, either up or down, of prices.

Uncovered option: See Naked writing.

Underlying futures contract: The futures contract that may be purchased or sold upon the exercise of the option.

Vertical spread (options): The simultaneous purchase and sale of two call or two put options differing only by exercise price.

Volatility: A measure of the amount by which an underlying future is expected to fluctuate in a given period of time.

Volume of trading (or sale): A total of futures transactions made in one trading session. A transaction is a purchase and matching sale.

Window: A marketing alternative that establishes both a price floor and price ceiling. A short position would create a window by purchasing a put and selling a call. A long position would create a window by purchasing a call and selling a put.

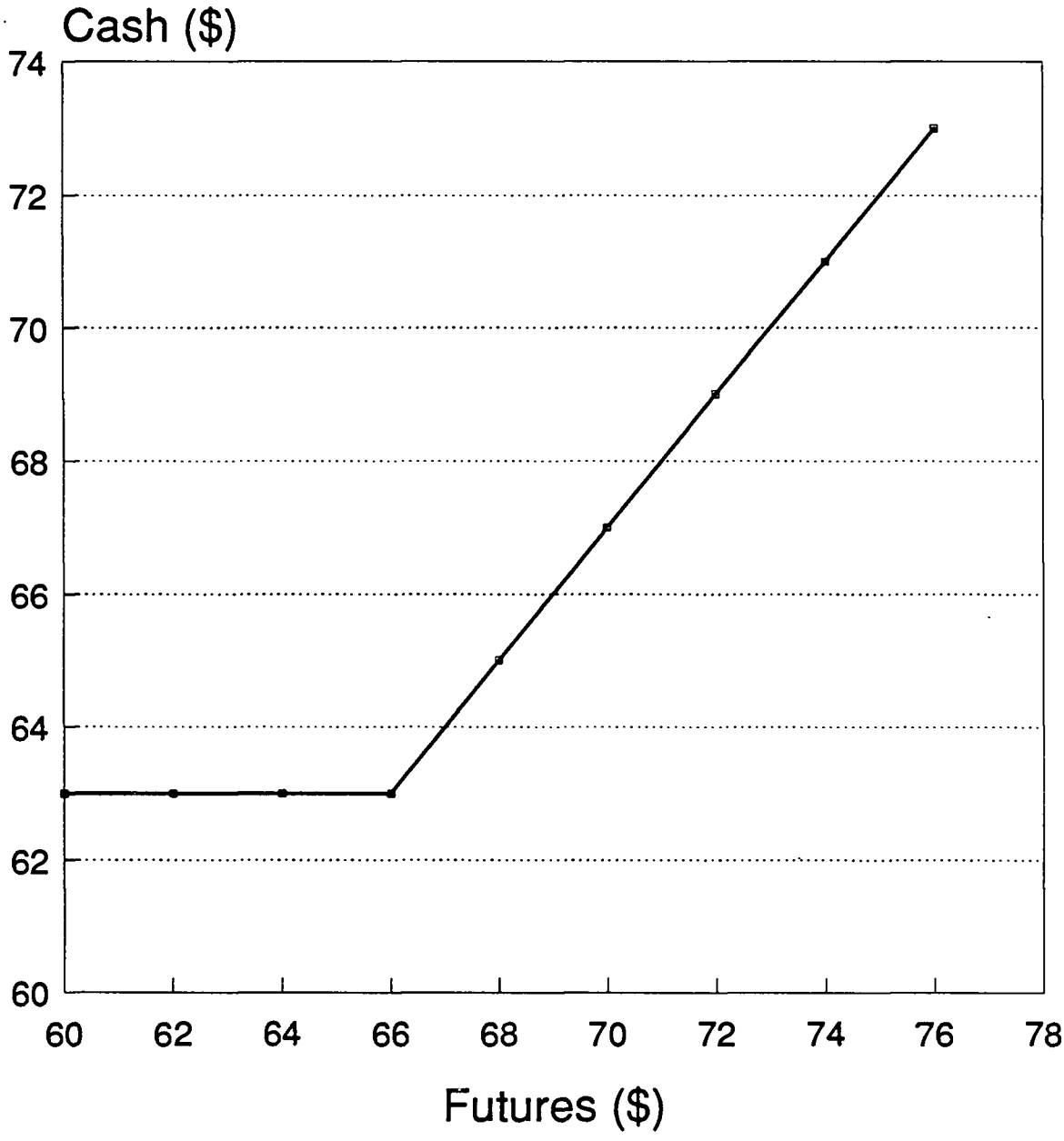
Writer: See Option writer.

Writing: The sale of an option in an opening transaction.

Appendix 2

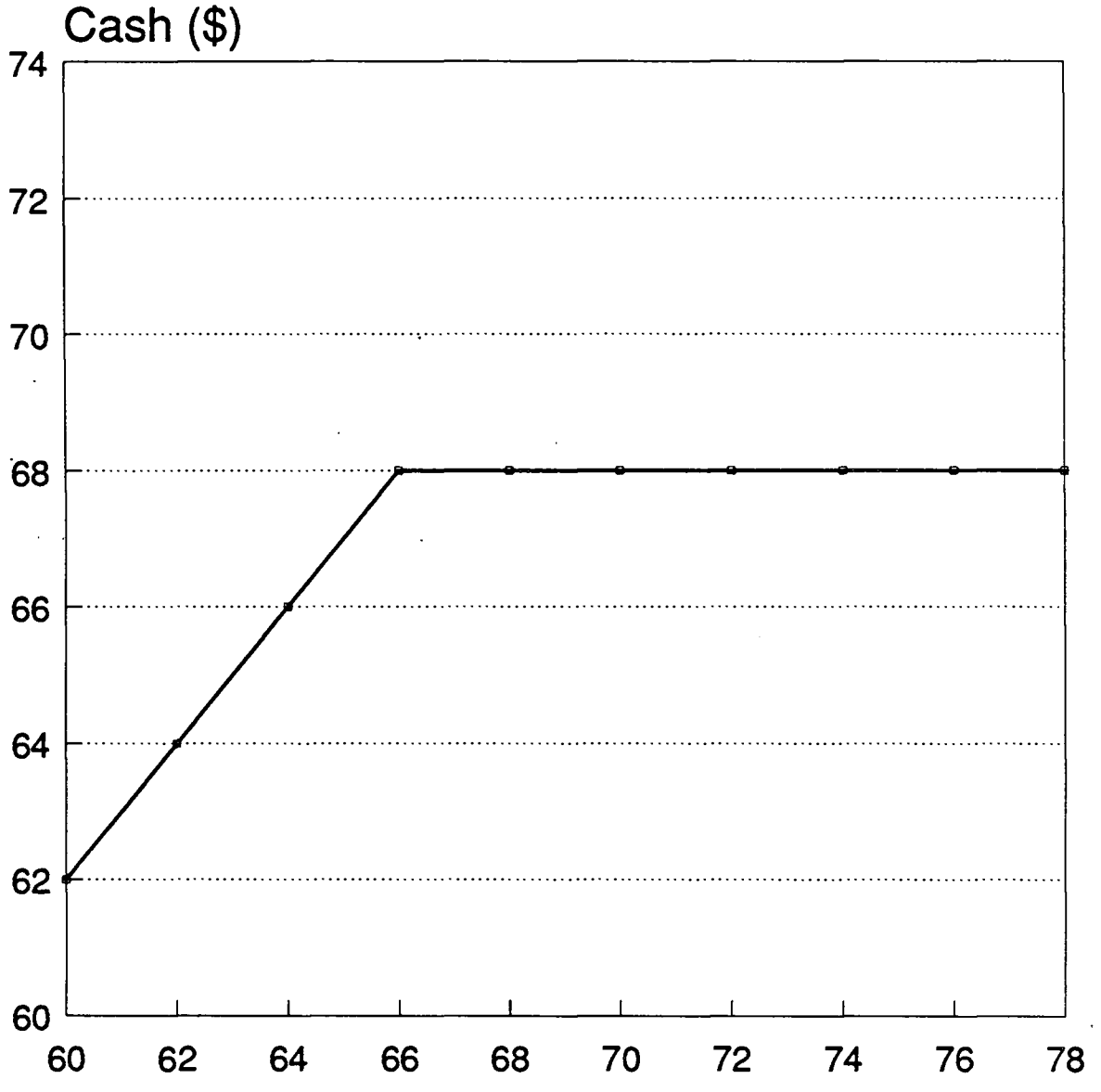
Option outcome charts

Purchase a $66 Put
$3 Premium



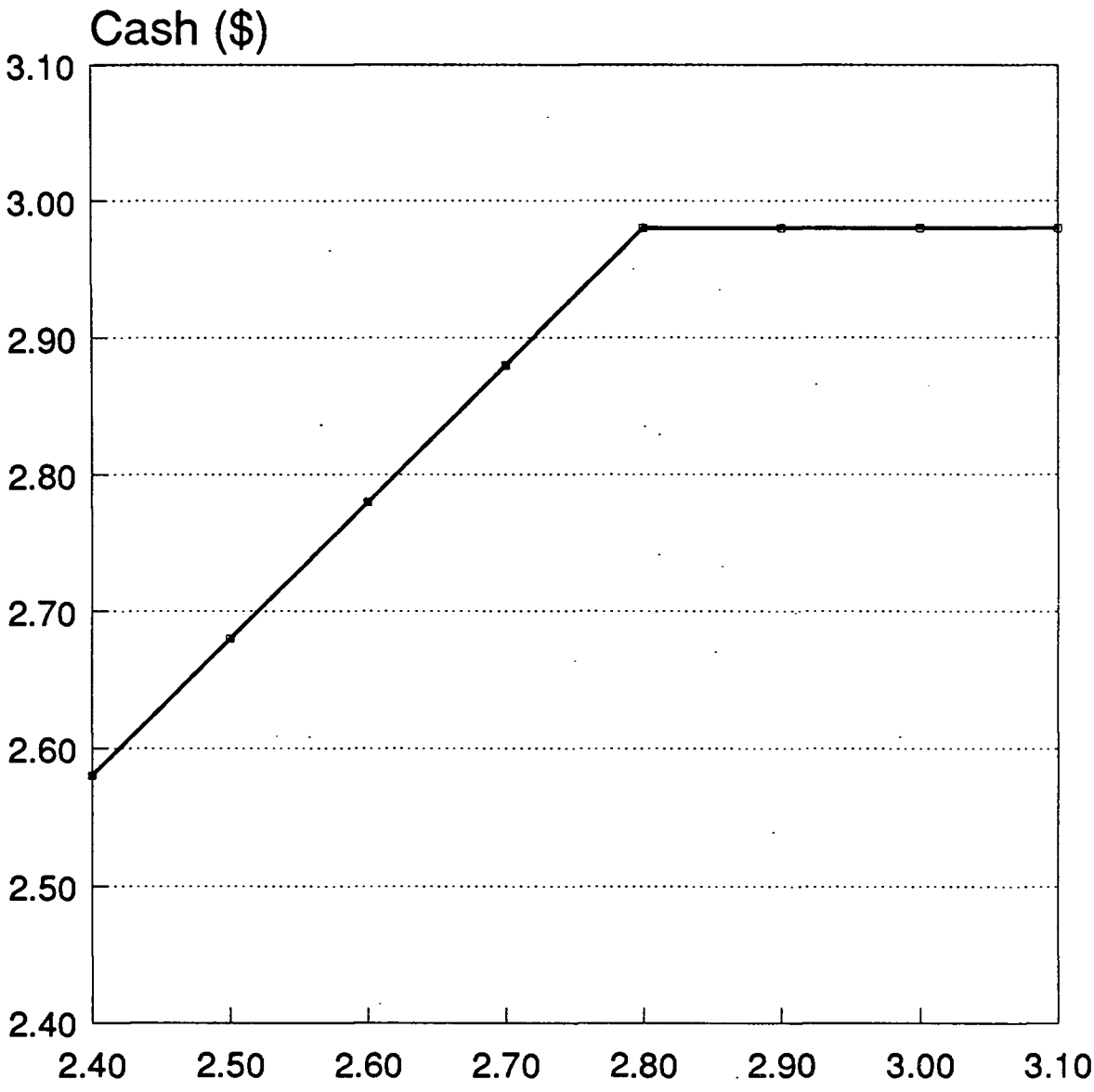
Assumes zero basis and fees

Sell $66 Call
$2 Premium



Assumes zero basis and fees

Purchase $2.80 Call
Premium $.18/bu.



Assumes zero basis and fees

Exercise 1

Video questions

Indicate whether each of the following statements is true (T) or false (F).

T F 1. The purchaser of a futures option contract purchases the right to buy or sell a futures contract at a contracted price.

T F 2. The premium is the price paid for a call or put option contract.

T F 3. A futures contract strike price is negotiable and can be settled at any time.

T F 4. Put option contracts offset call option contracts.

T F 5. Speculators sell option contracts and assume risk in return for receiving a premium.

T F 6. Call option contracts protect buyers of agricultural products against price increases.

T F 7. Put option contracts protect sellers of agricultural commodities against price decreases.

T F 8. An option contract purchaser must maintain a margin account in the same manner as a futures trader.

T F 9. Sellers of agricultural products usually use put option contracts more often than call options.

T F 10. If strike prices are above futures prices, puts will be described as in-the-money.

T F 11. If strike prices are above futures prices, calls will be described as at-the-money.

T F 12. Under no circumstances should producers of agricultural products get involved in selling call options.

T F 13. A short hedge position can be converted to a synthetic put by buying call options.

T F 14. An agricultural producer may use a price window to price anticipated output. This is accomplished by creating a price ceiling (selling a call) and a price floor (purchasing a put).

Exercise 2a

Purchase put: live cattle example

Part 1

Assumptions

- A cattle rancher is custom feeding 110 head of steers estimated to weigh 1,100 lbs. on September 15.
- The current date is June 1.
- Variable costs of production are $53/cwt.
- The producer's profit objective is $5/cwt.
- The September 15 basis is expected to be $1/cwt. under the CME October live cattle futures contract.
- The CME October live cattle futures contract (40,000 lbs.) is currently trading at $62/cwt.
- A CME October live cattle $62 put option contract can be purchased for $2.50/cwt.

Determine

1. How could the producer use the option market to establish a minimum price?

2. When does a CME October live cattle option contract expire?

3. How many option contracts would the producer need to purchase to protect the price of the anticipated output?

4. Calculate the producer's price objective. (Assume this is calculated considering variable costs [VC] plus a profit objective.)

5. Calculate the expected minimum price.

Exercise 2a: Purchase put—live cattle example

Part 2

Assumption

- For the following calculations, assume a CME October live cattle $62 put was purchased on June 1 for $2.50/cwt. and the cattle are being sold on September 15.

Determine

1. If the September 15 live cattle cash market is $58/cwt. and a CME October live cattle futures contract is trading for $59/cwt.:

   a. What is the actual basis?

   b. What is the minimum value of a CME October live cattle $62 put option contract?

   c. What is the net price received?

2. If the September 15 live cattle cash market is $70/cwt. and a CME October live cattle futures contract is trading for $71/cwt.:

   a. What is the actual basis?

   b. What is the minimum value of a CME October live cattle $62 put option?

   c. What is the net price received?

Exercise 2b

Purchase put: feeder cattle example

Part 1

Assumptions

- A cattle rancher is producing 130 head of steers estimated to weigh 675 lbs. on April 1.
- The current date is December 15.
- Variable costs of production are $52/cwt.
- The producer's profit objective is $10/cwt.
- The April 1 basis is expected to be $1/cwt. over the CME April feeder cattle futures contract.
- The CME April feeder cattle futures contract (44,000 lbs.) is currently trading at $64/cwt.
- A CME April feeder cattle $64 put option contract can be purchased for $2.50/cwt.

Determine

1. How could the producer use the option market to establish a minimum price?

2. When does a CME April feeder cattle option contract expire?

3. How many option contracts would the producer need to purchase to protect the price of the anticipated output?

4. Calculate the producer's price objective. (Assume this is calculated considering variable costs [VC] plus a profit objective.)

5. Calculate the expected minimum price.

Exercise 2b: Purchase put—feeder cattle example

Part 2

Assumption

- For the following calculations, assume a CME April feeder cattle $64 put was purchased on December 15 for $2.50/cwt. and the cattle are being sold on April 1.

Determine

1. If the April 1 feeder cattle cash market is $59/cwt. and a CME April feeder cattle futures contract is trading for $58/cwt.:

   a. What is the actual basis?

   b. What is the minimum value of a CME April feeder cattle $64 put option contract?

   c. What is the net price received?

2. If the April 1 feeder cattle cash market is $71/cwt. and a CME April feeder cattle futures contract is trading for $70/cwt.:

   a. What is the actual basis?

   b. What is the minimum value of a CME April feeder cattle $64 put option contract?

   c. What is the net price received?

Exercise 2c

Purchase put: hog example

Part 1

Assumptions

- A hog producer is producing 261 head of hogs estimated to weigh 230 lbs. on April 15.
- The current date is December 15.
- Variable costs of production are $41/cwt.
- The producer's profit objective is $10/cwt.
- The local April 15 basis is expected to be $2/cwt. under the CME June hog futures contract.
- The CME June hog futures contract (30,000 lbs.) is currently trading at $52/cwt.
- A CME June hog $52 put option contract can be purchased for $2.25/cwt.

Determine

1. How could the producer use the option market to establish a minimum price?

2. When does a CME June hog option contract expire?

3. How many option contracts would the producer need to purchase to protect the price of the anticipated output?

4. Calculate the producer's price objective. (Assume this is calculated considering variable costs [VC] plus a profit objective.)

5. Calculate the expected minimum price.

Exercise 2c: Purchase put—hog example

Part 2

Assumption

- For the following calculations, assume a CME June hog $52 put was purchased on December 15 for $2.25/cwt. and the hogs are being sold on April 15.

Determine

1. If the April 15 hog cash market is $46/cwt. and a CME June hog futures contract is trading for $48/cwt.:

   a. What is the actual basis?

   b. What is the minimum value of a CME June hog $52 put option contract?

   c. What is the net price received?

2. If the April 15 hog cash market is $54/cwt. and a CME June hog futures contract is trading for $56/cwt.:

   a. What is the actual basis?

   b. What is the minimum value of a CME June hog $52 put option?

   c. What is the net price received?

Exercise 2d

Purchase put: corn example

Part 1

Assumptions

- A corn producer is producing 10,000 bu. of corn for October 15 delivery.
- The current date is July 15.
- Variable costs of production are $2.10/bu.
- The producer's profit objective is $0.30/bu.
- The October 15 basis is expected to be $0.30/bu. under the CBT December corn futures contract.
- The CBT December corn futures contract (5,000 bu.) is currently trading at $2.60/bu.
- A CBT December corn $2.60 put option contract can be purchased for $0.15/bu.

Determine

1. How could the producer use the option market to establish a minimum price?

2. When does a CBT December corn option contract expire?

3. How many option contracts would the producer need to purchase to protect the price of the anticipated output?

4. Calculate the producer's price objective. (Assume this is calculated considering variable costs [VC] plus a profit objective.)

5. Calculate the expected minimum price.

Exercise 2d: Purchase put—corn example

Part 2

Assumption

- For the following calculations, assume a CBT December corn $2.60 put was purchased on July 15 for $0.15/bu. and the corn is being sold on October 15.

Determine

1. If the October 15 corn cash market is $2.10/bu. and a CBT December corn futures contract is trading for $2.40/bu.:

   a. What is the actual basis?

   b. What is the minimum value of a CBT December corn $2.60 put option contract?

   c. What is the net price received?

2. If the October 15 corn cash market is $2.50/bu. and a CBT December corn futures contract is trading for $2.80/bu.:

   a. What is the actual basis?

   b. What is the minimum value of a CBT December corn $2.60 put option?

   c. What is the net price received?

Exercise 3

Purchase call: corn example

Part 1

Assumptions

- A hog producer plans to purchase 10,000 bu. of corn for October 15 delivery.
- The current date is July 15.
- The October 15 basis is expected to be $0.30/bu. under the CBT December corn futures contract.
- The CBT December corn futures contract (5,000 bu.) is currently trading at $2.60/bu.
- A CBT December corn $2.60 call option contract can be purchased for $0.15/bu.

Determine

1. How could the producer use the option market to establish a maximum price?

2. When does a CBT December corn option contract expire?

3. How many option contracts would the producer need to protect the price of the anticipated purchase?

4. Calculate the expected maximum price.

Exercise 3: Purchase call—corn example

Part 2

Assumption

- For the following calculations, assume a CBT December corn $2.60 call was purchased on July 15 for $0.15/bu. and the corn is being purchased on October 15.

Determine

1. If the October 15 corn cash market is $2.10/bu. and a CBT December corn futures contract is trading for $2.40/bu.:

   a. What is the actual basis?

   b. What is the maximum value of a CBT December corn $2.60 call option contract?

   c. What is the net price paid?

2. If the October 15 corn cash market is $2.50/bu. and a CBT December corn futures contract is trading for $2.80/bu.:

   a. What is the actual basis?

   b. What is the maximum value of a CBT December corn $2.60 call option?

   c. What is the net price paid?

Exercise 4

Synthetic put: feeder cattle example

On June 1, a feeder cattle producer forward cash contracted 800-lb. steers for November 10 delivery at $68/cwt. On August 10, the CME November feeder cattle futures contract had fallen to $64.50/cwt., and the feeder cattle option markets reflected the following quotes.

November feeder cattle options

	Premium ($/cwt.)	
Strike price ($)	Put	Call
64	1.05	2.05
66	2.05	1.05
68	3.30	0.40
70	NQ	0.20

The producer's average transaction cost to trade options is $0.30/cwt.

1. If the producer believes this is a temporary downward adjustment in the market and there is a good probability of higher prices in the feeder market before November, what marketing alternatives could the producer consider?

2. If the producer purchases a call (establishing a synthetic put), show the minimum price that could be established for each strike price.

3. If the November feeder cattle futures price increases to $69/cwt. in November, what will be the net price for each strike price (assuming the producer established a synthetic put)?

4. Given the data generated above, what recommendation would you make to this producer? Please explain your answer.

Exercise 5

Synthetic call: corn example

On April 15, a hog producer forward purchased 10,000 bu. of corn for November delivery at $2.20/bu. On July 1, the CBT December corn futures contract had increased to $2.55/cwt. and the corn options markets reflected the following quotes.

December corn options

	Premium ($/bu.)	
Strike price ($)	Put	Call
2.50	0.16	0.19
2.60	0.22	0.15
2.70	0.27	0.12
2.80	0.35	0.09
2.90	0.43	0.08
3.00	0.51	0.06

The producer's average transaction cost to trade options is $0.02/bu.

1. If the producer believes that this is a temporary upward adjustment in the market and there is a good probability of lower prices in the corn market before November, what marketing alternatives could the producer consider?

2. If the producer purchases a put (establishing a synthetic call), show the maximum price that could be established for each strike price.

3. If the CBT December corn futures price decreases to $2.00 in November, what will be the net price for each strike price assuming the producer established a synthetic call?

4. Given the data generated above, what recommendation would you make to this producer? Please explain your answer.

Exercise 6

Establishing a price window for feeder cattle

The feeder cattle market has been trading in a $4/cwt. range for the past three months. A feeder cattle producer has been observing this price pattern and expects the market to continue to drift in a sideways manner. However, the producer is concerned about the market price weakening and decides to evaluate alternative price protection strategies.

1. What price alternatives does the producer have?

Upon investigation, the producer establishes the following facts:

- The feeder steers should weigh 800 lbs. on September 10 with a break-even price of $76.
- The current price forecast is for a sideways market with a greater probability of prices declining than increasing.
- The expected September 10 basis is +$2.00/cwt.
- Today's date is July 15 and CME September feeder cattle futures contracts are trading at $76.40/cwt.
- The following quotes are offered on the CME September feeder cattle option market.

	Premium ($/cwt.)	
Strike price ($)	Put	Call
74	1.10	--
76	1.85	--
78	3.00	1.40

- The transaction costs (brokerage, interest) for purchasing puts are $0.30/cwt. while the transaction costs for hedging and selling calls are $0.75/cwt., considering potential margin calls.

2. Calculate the minimum price of:
   a. purchasing a $76 put.

   b. purchasing a $78 put.

   c. hedging at $76.40.

3. Calculate the minimum and maximum price if a window is set by purchasing a $74 put and selling a $78 call.

4. Calculate the net price received for the following alternative price outcomes for each marketing alternative.

					Window
Futures price	Cash price	Hedge $76.40	$76 Put	$78 Put	$74 Put $78 Call
86	_____	_____	_____	_____	_____
81	_____	_____	_____	_____	_____
76	_____	_____	_____	_____	_____
71	_____	_____	_____	_____	_____
66	_____	_____	_____	_____	_____

Answer key 1

Video questions

Indicate whether each of the following statements is true (T) or false (F).

(T) F 1. The purchaser of a futures option contract purchases the right to buy or sell a futures contract at a contracted price.

(T) F 2. The premium is the price paid for a call or put option contract.

T (F) 3. A futures contract strike price is negotiable and can be settled at any time.

Comment: False. A futures contract strike price is specified when an option contract is bought or sold.

T (F) 4. Put option contracts offset call option contracts.

Comment: False. A holder of a put option contract would realize its value only by selling an identical put option contract or by exercising the contract. The same is true for holders of call option contracts. Puts and calls are bought and sold on separate markets.

(T) F 5. Speculators sell option contracts and assume risk in return for receiving a premium.

(T) F 6. Call option contracts protect buyers of agricultural products against price increases.

(T) F 7. Put option contracts protect sellers of agricultural commodities against price decreases.

T (F) 8. An option contract purchaser must maintain a margin account in the same manner as a futures trader.

Comment: False. Since the most that an option contract buyer can possibly lose is the option premium, that is the most the buyer will ever have to deposit with the broker.

(T) F 9. Sellers of agricultural products usually use put option contracts more often than call options.

(T) F 10. If strike prices are above futures prices, puts will be described as in-the-money.

T (F) 11. If strike prices are above futures prices, calls will be described as at-the-money.

Comment: False. This situation would be described as being out-of-the-money.

T (F) 12. Under no circumstances should producers of agricultural products get involved in selling call options.

Comment: False. Selling option contracts may be used with other marketing tools to establish different marketing strategies.

(T) F 13. A short hedge position can be converted to a synthetic put by buying call options.

(T) F 14. An agricultural producer may use a price window to price anticipated output. This is accomplished by creating a price ceiling (selling a call) and a price floor (purchasing a put).

Answer key 2a

Purchase put: live cattle example

Part 1

1. A minimum price can be established by **purchasing CME October live cattle put option contracts.**
2. A CME live cattle futures option contract expires **the month prior to delivery of the underlying futures contract. A CME October live cattle put option contract expires in September.**
3. To protect the price of 110 head of 1,100-lb. live steers, the producer would purchase **three** CME October live cattle put option contracts.

   110 head X 1,100 lbs. per head = 121,000 lbs. $\frac{121{,}000 \text{ lbs.}}{40{,}000 \text{ lbs. per contract}} \approx$ **3 contracts**
4. The producer's price objective is **$58/cwt.** ($53 variable costs + $5 expected profit)
5. The expected minimum price is **$58.50/cwt.** ($62 CME October live cattle put option contract – $1 under expected basis – $2.50 option premium)

Part 2

1a. The actual basis is $1 under, or **–$1.** ($58 cash price – $59 CME October live cattle futures contract)

1b. The minimum value of the CME October $62 live cattle put option contract would be **$3/cwt.** ($62 strike price – $59 underlying futures contract)

1c. The net price received would be the **expected minimum price of $58.50/cwt.** ($58 cash price + $3 option premium received [intrinsic value] – $2.50 option premium paid)

2a. The actual basis is $1 under, or **–$1.** ($70 cash price – $71 CME October live cattle futures contract)

2b. Since the CME October live cattle futures price is greater than the CME October $62 live cattle put option, the (intrinsic) value of the option would be **zero.** The purchaser of a put option contract would allow the contract to expire. ($62 strike price – $71 CME October live cattle futures contract = –$9)

2c. The net price received would be **$67.50/cwt.** ($70 cash price – $2.50 option premium paid)

Answer key 2b

Purchase put: feeder cattle example

Part 1

1. A minimum price can be established by **purchasing CME April feeder cattle put option contracts.**
2. Due to cash settlement, a CME feeder cattle futures option contract expires the same day as the **underlying futures contract. A CME April feeder cattle put option contract expires in April.**
3. To protect the price of 130 head of 675-lb. feeder cattle, the producer would purchase two CME April feeder cattle put option contracts.

   130 head X 675 lbs. per head = 87,750 lbs. $\quad \frac{87{,}750 \text{ lbs.}}{44{,}000 \text{ lbs. per contract}} \approx$ **2 contracts**

4. The producer's price objective is **$62/cwt.** ($52 variable costs + $10 expected profit)
5. The expected minimum price is **$62.50/cwt.** ($64 CME April feeder cattle put option contract + $1 over expected basis – $2.50 option premium)

Part 2

1a. The actual basis is $1 over, or **+$1.** ($59 cash price – $58 CME April feeder cattle futures contract)

1b. The minimum value of the CME April $64 feeder cattle put option contract would be **$6/cwt.** ($64 strike price – $58 underlying futures contract)

1c. The net price received would be the **expected minimum price of $62.50/cwt.** ($59 cash price + $6 option premium received [intrinsic value] – $2.50 option premium paid)

2a. The actual basis is $1 over, or **+$1.** ($71 cash price – $70 CME April feeder cattle futures contract)

2b. Since the CME April feeder cattle futures price is greater than the CME April $62 feeder cattle put option, the (intrinsic) value of the option would be **zero.** The purchaser of a put option contract would allow the contract to expire. ($64 strike price – $69 CME April feeder cattle price = –$5)

2c. The net price received would be **$67.50/cwt.** ($70 cash price – $2.50 option premium paid)

Answer key 2c

Purchase put: hog example

Part 1

1. A minimum price can be established by **purchasing CME June hog put option contracts.**
2. A CME hog futures option contract expires **the month prior to delivery of the underlying futures contract. A CME June live hog put option contract expires in May.**
3. To protect the price of 261 head of 230-lb. hogs, the producer would purchase **two** CME June hog put option contracts.

   261 head X 230 lbs./head = 60,030 lbs. $\quad \frac{60{,}030 \text{ lbs.}}{30{,}000 \text{ lbs. per contract}} \approx$ **2 contracts**
4. The producer's price objective is **$51/cwt.** ($41 variable costs + $10 expected profit)
5. The expected minimum price is **$47.75/cwt.** ($52 CME June hog put option contract – $2 under expected basis – $2.25 option premium)

Part 2

1a. The actual basis is $2 under, or **–$2.** ($46 cash price – $48 CME June hog futures contract)

1b. The minimum value of the CME June $52 hog put option contract would be **$4/cwt.** ($52 strike price – $48 underlying futures contract)

1c. The net price received would be the **expected minimum price of $47.75/cwt.** ($46 cash price + $4 option premium received [intrinsic value] – $2.25 option premium paid)

2a. The actual basis is $2 under, or **–$2.** ($54 cash price – $56 CME June hog futures contract)

2b. Since the CME June hog futures price is greater than the CME June $52 hog put option, the (intrinsic) value of the option would be **zero.** The purchaser of a put option contract would allow the contract to expire. ($52 strike price – $56 CME June hog price = –$4)

2c. The net price received would be **$51.75/cwt.** ($54 cash price – $2.25 option premium paid)

Answer key 2d

Purchase put: corn example

Part 1

1. A minimum price can be established by **purchasing CBT December corn put option contracts.**
2. A CBT corn futures option contract expires **the month prior to delivery of the underlying futures contract. A CBT December corn put option contract expires in November.**
3. To protect the price for 10,000 bu. of corn, the producer would purchase two CBT December corn put option contracts.

$$\frac{\text{10,000 bu.}}{\text{5,000 bu. per contract}} = \textbf{2 contracts}$$

4. The producer's price objective is **$2.40/bu.** ($2.10 variable costs + $0.30 expected profit)
5. The expected minimum price is **$2.15/bu.** ($2.60 CBT December corn put option contract – $0.30 expected basis – $0.15 option premium)

Part 2

1a. The actual basis is $0.30 under, or **–$0.30.** ($2.10 cash price – $2.40 CBT December corn futures contract)

1b. The minimum value of the CBT December $2.60 corn put option contract would be **$0.20/bu.** ($2.60 strike price – $2.40 underlying futures contract) Since there would be over one month remaining in the option contract, the contract may have time value in addition to the $0.20/bu. intrinsic value.

1c. The net price received would be the **expected minimum price of $2.15/bu.** ($2.10 cash price + $0.20 option premium received [intrinsic value] – $0.15 option premium paid)

2a. The actual basis is $0.30 under, or **–$0.30.** ($2.50 cash price – $2.80 CBT December corn futures contract)

2b. Since the CBT December corn futures price is greater than the CBT December $2.60 corn put option, the (intrinsic) value of the option would be **zero.** The purchaser of a put option contract would allow the contract to expire. ($2.60 strike price – $2.80 CBT December corn price = –$0.20)

2c. The net price received would be **$2.35/bu.** ($2.50 cash price – $0.15 option premium paid)

Answer key 3

Purchase call: corn example

Part 1

1. A maximum price can be established by **purchasing CBT December corn call option contracts.**
2. A CBT corn futures option contract expires **the month prior to delivery of the underlying futures contract. A CBT December corn call option contract expires in November.**
3. To protect the price for 10,000 bu. of corn, the producer would buy **two** CBT December corn call option contracts.

$$\frac{\text{10,000 bu.}}{\text{5,000 bu. per contract}} = \textbf{2 contracts}$$

4. The expected maximum price is **$2.45/bu.** ($2.60 CBT December corn call contract – $0.30 under expected basis + $0.15 option premium)

Part 2

1a. The actual basis is $0.30 under, or **–$0.30.** ($2.10 cash price – $2.40 CBT December corn futures contract)

1b. Since the CBT December corn futures price is less than the CBT December $2.60 call option, the (intrinsic) value of the option would be **zero.** The buyer of a call option contract would allow the contract to expire. ($2.40 CBT December corn future – $2.60 CBT strike price = –$0.20)

1c. The net price paid would be **$2.25/bu.** ($2.10 cash price + $0.15 option premium paid)

2a. The actual basis is $0.30 under, or **–$0.30.** ($2.50 cash price – $2.80 CBT December corn futures contract)

2b. The maximum value of the CBT December $2.60 call option contract would be **$0.20.** ($2.80 CBT December corn futures price – $2.60 CBT December call strike price = $0.20) Since there would be over one month remaining in the option contract, the contract could have time value in addition to the $0.20/bu. intrinsic value.

2c. The net price paid would be the expected **$2.45/bu.** ($2.50 cash price – $0.20 option premium received [intrinsic value] + $0.15 premium paid)

Answer key 4

Synthetic put: feeder cattle example

On June 1, a feeder cattle producer forward cash contracted 800-lb. steers for November 10 delivery at $68/cwt. On August 10, the CME November feeder cattle futures contract had fallen to $64.50/cwt., and the feeder cattle option markets reflected the following quotes.

November feeder cattle options

	Premium ($/cwt.)	
Strike price ($)	Put	Call
64	1.05	2.05
66	2.05	1.05
68	3.30	0.40
70	NQ	0.20

The producer's average transaction cost to trade options is $0.30/cwt.

1. If the producer believes this is a temporary downward adjustment in the market and there is a good probability of higher prices in the feeder market before November, what marketing alternatives could the producer consider?

   a. Do nothing. Enjoy the forward contract position already established.

   b. Purchase a call and establish a synthetic put. The producer is speculating that prices will increase.

2. If the producer purchases a call (establishing a synthetic put), show the minimum price that could be established for each strike price.

Strike price	Cash contract price	Call premium	Trans. cost	Minimum price*
64	**68**	**2.05**	**0.30**	**65.65**
66	**68**	**1.05**	**0.30**	**66.65**
68	**68**	**0.40**	**0.30**	**67.30**
70	**68**	**0.20**	**0.30**	**67.50**

*** Minimum price = Cash contract price – Premium – Transaction cost**

3. If the November feeder cattle futures price increases to $69/cwt. in November, what will be the net price for each strike price (assuming the producer established a synthetic put)?

   The net price for CME November feeder cattle futures is $69/cwt.

Strike price	Minimum price	Intrinsic value	Net price*
64	65.65	5.00	70.65
66	66.65	3.00	69.65
68	67.30	1.00	68.30
70	67.50	0.00	67.50

   * Net price = Minimum price + Intrinsic value

4. Given the data generated above, what recommendation would you make to this producer? Please explain your answer.

   There is not a clear-cut answer to this question. The discussion should center around the risk and return of establishing the synthetic put versus simply taking advantage of the initial forward cash position. If the producer expects the price to remain in the $64 to $69 range, the net price received from the synthetic put seems rather small for the risk. On the other hand, if the producer expects prices to move substantially above this range, then a synthetic put becomes more attractive.

Answer key 5

Synthetic call: corn example

On April 15, a hog producer forward purchased 10,000 bu. of corn for November delivery at $2.20/bu. On July 1, the CBT December corn futures contract had increased to $2.55/bu. and the corn options markets reflected the following quotes.

December corn options

	Premium ($/bu.)	
Strike price ($)	Put	Call
2.50	0.16	0.19
2.60	0.22	0.15
2.70	0.27	0.12
2.80	0.35	0.09
2.90	0.43	0.08
3.00	0.51	0.06

The producer's average transaction cost to trade options is $0.02/bu.

1. If the producer believes this is a temporary upward adjustment in the market and there is a good probability of lower prices in the corn market before November, what marketing alternatives could the producer consider?

   a. Do nothing. Enjoy the forward contract position already established.

   b. Purchase a put and establish a synthetic call. The producer is speculating that prices will decrease.

2. If the producer purchases a put (establishing a synthetic call), show the maximum price that could be established for each strike price.

Strike price	Cash contract price	Call premium	Trans. cost	Maximum price*
2.50	2.20	0.16	0.02	2.38
2.60	2.20	0.22	0.02	2.44
2.70	2.20	0.27	0.02	2.49
2.80	2.20	0.35	0.02	2.57
2.90	2.20	0.43	0.02	2.65
3.00	2.20	0.51	0.02	2.75

*** Maximum price = Cash contract price + Premium + Transaction cost**

3. If the CBT December corn futures price decreases to $2.00 in November, what will be the net price for each strike price (assuming the producer established a synthetic call)?

Strike price	Maximum price	Intrinsic value	Net price*
2.50	2.38	0.50	1.88
2.60	2.44	0.60	1.84
2.70	2.47	0.70	1.79
2.80	2.57	0.80	1.77
2.90	2.65	0.90	1.75
3.00	2.73	1.00	1.73

*** Net price = Maximum price – Intrinsic value**

4. Given the data generated above, what recommendation would you make to this producer? Please explain your answer.

There is not a clear cut answer to this question. The discussion must center around the risk and return of establishing the synthetic call versus simply taking advantage of the initial forward purchase position. If the producer expects the cash price to remain above $2.40, the net price received from the synthetic call seems rather small for the risk. On the other hand, if the producer expects the price to fall below $2.40, then a synthetic put can lower the effective net price paid for the corn.

Answer key 6

Establishing a price window for feeder cattle

The feeder cattle market has been trading in a $4/cwt. range for the past three months. A feeder cattle producer has been observing this price pattern and expects the market to continue to drift in a sideways manner. However, the producer is concerned about the market price weakening and decides to evaluate alternative price protection strategies.

1. What price alternatives does the producer have?

   a. forward cash contract
   b. hedge (establish a short position)
   c. purchase a put
   d. create a price window
   e. do nothing; speculate

Upon investigation, the producer establishes the following facts:

- The feeder steers should weigh 800 lbs. on September 10 with a break-even price of $76.
- The current price forecast is for a sideways market with a greater probability of prices declining than increasing.
- The expected September 10 basis is +$2.00/cwt.
- Today's date is July 15 and CME September feeder cattle futures contracts are trading at $76.40/cwt.
- The following quotes are offered on the CME September feeder cattle option market.

	Premium ($/cwt.)	
Strike price ($)	Put	Call
74	1.10	--
76	1.85	--
78	3.00	1.40

- The transaction costs (brokerage, interest) for purchasing puts are $0.30/cwt. while the transaction costs for hedging and selling calls are $0.75/cwt., considering potential margin calls.

2. Calculate the minimum price of:
   a. purchasing a $76 put.
   $75.85 ($76 strike price + $2 basis – $1.85 premium – $0.30 cost)
   b. purchasing a $78 put.
   $76.70 ($78 strike price + $2 basis – $3.00 premium – $0.30 cost)
   c. hedging at $76.40.
   $77.65 ($76.40 futures price + $2 basis – $0.75 cost)

3. Calculate the minimum and maximum price if a window is set by purchasing a $74 put and selling a $78 call.
   Minimum price: $75.25 [$74 strike price + $2 basis + ($1.40–$1.10) – ($0.75 + $0.30]
   Maximum price: $79.25 [$78 strike price + $2 basis + ($1.40–$1.10) – ($0.75 + $0.30]

4. Calculate the net price received for the following alternative price outcomes for each marketing alternative.

Futures price	Cash price	Hedge $76.40	$76 Put	$78 Put	Window $74 Put $78 Call
86	88	77.65	85.85	84.70	79.25
81	83	77.65	80.85	79.70	79.25
76	78	77.65	75.85	76.70	77.25
71	73	77.65	75.85	76.70	75.25
66	68	77.65	75.85	76.70	75.25

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