### **UT Extension** W 320A

# Using Futures Markets to Manage Price Risk in Feeder Cattle Operations

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# Introduction

n today's farming environment of extreme price volatility and large debt commitments, many livestock producers need the financial security of one or more of the advantages offered by price-risk management tools. Livestock producers, when selling products or purchasing inputs, can either accept the market price at delivery, or point of purchase, or reduce input and product price risks by using pricerisk management tools. One price-risk management opportunity is available through futures market contracts. This publication explains how livestock producers can use futures markets to manage price risk.



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## Who Uses the Futures Market?

wo groups are interested in futures trading: speculators and hedgers. Speculators enter the futures market with the objective to make a profit from changes in futures prices. They establish a price for a commodity they neither own nor have committed to produce. They have no intention of delivering or accepting delivery of the product traded. Speculators trade to make a profit from price variability. Speculators trade based on the belief that the price of a commodity is too low (or high) and hope by buying (or selling) futures contracts today, they can later liquidate the contracts at a profit. Thus, the key to speculating is buying low and selling high or selling high and buying low. This may sound easy; however, the majority of futures market speculators (nearly 90 percent) lose money at some point. Speculators also serve a key role in the futures market; they provide liquidity to the market, which means they provide enough active trade to ensure an order can be quickly filled.

The other trader is the hedger. The hedger establishes a price for a commodity that is either owned or committed for production and that will be delivered in the future (e.g., grain, oilseed or livestock), or that will be purchased in the future (e.g., feed ingredient, or crops by elevators, gins, etc.). Hedging is the opposite of speculating in the market. Speculators participate in the futures market to capitalize on price changes, while hedgers participate in the futures market to mitigate the risk associated with price changes. For instance, a hedger may use the futures market to lock-in the selling price of feeder cattle or to lock-in the price of corn that will be used as feed. Using futures markets does not

Speculator: futures or options trader who is attempting to earn profits in commodity futures or options.
Hedger: futures or options trader who has a position, or will have a position, in the cash market and wishes to transfer risk of cash market price fluctuations to someone else.

guarantee a profit, but the use of futures markets can help protect an advantageous price.

#### **Hedgers as Sellers**

When a hedger uses the futures market to sell, the hedger sells a commodity futures contract to "*lock-in*" a selling price. It can be thought of as pre-selling in the futures market. When the product is ready for physical delivery in the cash market (when the hedger is ready to take the grain to the local elevator, the feeder cattle to auction market, etc.), the hedger buys the contract in the futures market to offset or nullify the previous sale and delivers the product to the local market.

*Lock-in:* actually means locking-in a price range. The price range that is locked-in is determined by how much the basis changes from when a hedger starts using the futures market to hedge a commodity.

For example, a cattle producer planning to sell feeder cattle five months from today could hedge the price of the feeder cattle by selling a futures market contract today and then buying it back on the same day the feeder cattle are physically sold. Selling a futures contract is considered locking-in a price because when futures prices increase /decrease it is expected the cash price will also increase/decrease. Thus, any profits or losses made in the futures market are, to some extent, offset by opposite losses or profits in the cash market because futures prices and cash prices tend to move together.

A hedger operates in two markets, with the resulting actions demonstrated in Figure 1.

Speculators, on the other hand, have no product to deliver. If they sell a contract in

the futures market, they will have to later buy a contract to offset this previous sale (in the same way the hedger does). When speculators offset their contracts, they have no product to sell on the cash market to offset losses in the futures market. To make a profit, speculators must be able to buy, or offset, at a lower price than they sold; or, they must sell at a higher price than they paid for a futures contract.

Hedging is a method of managing price risk by transferring that risk to speculators. Speculators take on price risk associated with commodities they do not own. The reason futures markets exist is to transfer the risk of price changes from those who do not want it (hedgers), to those who want to speculate on these price changes for an opportunity to make a profit.



#### Figure 1. Cash Market and Futures Market Flow Chart for Buying and Selling

Producers who do not attempt to manage price risk are considered speculators in the cash market. They are speculators because they produce or store their products unpriced. They have capital, labor, and many other resources committed to production, and they do not know what price they will receive until sale day. In this respect, the producer who produces unhedged is in the same position as the speculator in the futures market. The producer is gambling that the selling price will be higher than their cost of production. Thus, speculators can be found in both the cash market and futures market.

Speculators serve an important role in the futures markets by providing liquidity. If it were not for speculators, many futures contracts would fail to trade.

Who are the speculators, and who are the hedgers in the market? Speculators may be professional traders who buy and sell contracts and offset them on the same day or after a short period of time. Speculators may also be business people operating in the futures market in an attempt to make money by anticipating price changes.

Hedgers are producers, processors, handlers, dealers, or anyone who uses the markets (either futures or cash markets) to forward-price their sales or purchases. Remember, hedging is simply forwardpricing. If a person uses the futures market to forward-price, they are a hedger.

#### **Hedgers as Buyers**

Some producers may be interested in locking-in purchase prices. An example would be dairy, beef and pork producers pre-purchasing feed ingredients. Buyers, similar to sellers, can use futures to "prebuy" inputs they will later purchase in the cash market. When a hedger uses the futures market to buy a commodity, the hedger buys the appropriate futures market contract to establish a purchase price. When it is time to purchase the commodity in the cash market (when the hedger is ready to buy the feed or take delivery of the grain to merchandise), the hedger sells the contract in the futures market to offset or nullify the previous buy and takes delivery of the product in the local market.

The net effect is the same as with the selling hedge: Any profits or losses made in the futures market are, to some extent, offset by opposite losses or profits in the cash market.

### **How Hedging Works**

A hedger operates in two markets: the cash market and the futures market. The following is an example to demonstrate how this would work. Assume it is mid-November and a feeder cattle producer is interested in hedging cattle that will be marketed in mid-April.

The first step for the hedger is to choose the appropriate futures contract. The Chicago Mercantile Exchange (CME) Feeder Cattle (FC) contract represents 50,000 pounds of feeder cattle weighing 650-849 pounds. Therefore, the CME FC contract represents 59-77 head of feeder cattle, depending on weight. See Table 1 for the specifications of the FC futures contract.

The hedger is interested in the futures contract maturing closest to, but not before, the time the cattle are ready to market. Since there is an April futures contract and the cattle will be priced in April, the hedger selects the April futures contract. The current futures market price for this futures contract can be viewed by looking either on the Internet or an electronic marketing

ltem	Corn	Soybean	Soybean Meal	Live Cattle	<b>Feeder Cattle</b>
Contract Size	5,000 bushels	5,000 bushels	100 short tons	40,000 pounds	50,000 pounds
Deliverable Grade/Product Description	#2 Yellow at contract price, #1 Yellow at a 1.5 cent/ bu premium, #3 Yellow at a 1.5 cent/bu discount	#2 Yellow at contract price, #1 Yellow at a 6 cent/ bu premium, #3 Yellow at a 6 cent/bu discount	48% Protein Soybean Meal	55% Choice, 45% Select, Yield Grade 3 live steers	650-849 pound steers, medium- large #1, and medium-large #1-2
Contract Months	Mar, May, Jul, Sep, Dec	Jan, Mar, May, Jul, Aug, Sep, Nov	Jan, Mar, May, Jul, Aug, Sep, Oct, Dec	Feb, Apr, Jun, Aug, Oct, Dec	Jan, Mar, Apr, May, Aug, Sep, Oct, Nov
Last Trade Date	The business day prior to the 15th calendar day of the contract	The business day prior to the 15th calendar day of the contract month.	The business day prior to the 15th calendar day of the contract	Last business day of the contract month.	Last Thursday of the contract month with exceptions for November and other months.

Table 1. Futures Contract Specifications for Various Commodities

service. Assuming the April futures closed today at \$175 per hundredweight (cwt), the hedger should answer two questions:

- 1. What does the futures quote of \$175/ cwt mean through a hedge?
- 2. Once the hedge price is known, how is the price "locked-in"?

#### What does a futures price quote mean?

The \$175/cwt April 20XX CME contract price represents the weighted average value of 650-849 pound medium and large frame #1-2 steers reported by USDA during April 20XX. The local market price will be related to the futures market price during the delivery month, as feeder cattle prices are determined in a national market.

The CME FC futures contract price generally converges with the CME Feeder Cattle Index price at time of contract expiration. The CME Feeder Cattle Index is a sevenday rolling weighted average price of cattle physically marketed through auction, direct sales, and video/Internet sales in the 12-state region of Colorado, Iowa, Kansas, Missouri, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas and Wyoming. To be used in the feeder cattle index, cattle must meet the futures contract specifications. The feeder cattle price index is used to settle open contracts after the termination of trading on the last Thursday of the contract month.

#### How is the price "locked-in?"

Local feeder cattle cash prices move with futures prices. Therefore, if feeder cattle futures prices go up or down, those changes will be reflected at the local market. If the hedger knows the historical relationship between the local cash price and the futures market price, the hedger can use the futures market price to estimate what cattle may sell for in the local cash market at the time the futures contract is due. This relationship is called basis. *Basis* is the difference between the local cash price and the futures price (Basis = Local Cash Price - Futures Price). The basis equation can be rearranged to provide an estimate of the expected local cash price by adding the historical basis to the current futures price for the contract month being considered (expected local cash price in April = historical basis + today's [November] futures price for an April contract).

For example, assume the hedger finds the historical difference between local cash market prices in April with April futures prices to be an average of -\$10/cwt. That is, the price of cattle similar to what the hedger plans to sell in April has averaged \$10/cwt less in the local cash market than the April futures prices on the same day in April.

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**Basis:** the difference between a commodity's current cash price and a designated futures contract price (Basis = Local Cash Price – Futures Price). Using the futures market to hedge is a way to trade price risk for basis risk. The reason for trading price risk for basis risk is that prices tend to be more volatile than the basis. The basis can change in time, but, in general, as the futures price increases/ decreases the local price increases/ decreases and the difference is less than that experienced in prices. The UT Extension publication W320C, "Understanding and Using Cattle Basis in Managing Price Risk," contains a more detailed explanation of factors affecting basis.

Now, the hedger can adjust the futures price to reflect an estimate of delivery in the local cash market. If in April the hedger's local market averages \$10/cwt less than the April futures price, the futures price of \$175 results in an estimated local cash price of \$165/cwt (\$175/cwt - \$10/cwt basis). This is the local cash price the futures market is currently offering through a hedge for feeder cattle sold in April.

Put this in terms of the two markets in which the hedger operates—the cash market and the futures market—assuming it is currently November 15.

Date	Cash Market	Futures Market	Expected Basis
November 15	Expected cash price in April = Futures price + (basis) Expected cash price in April = \$175 + (-\$10) = \$165/cwt	April FC Futures @ \$175/cwt	-\$10/cwt

While the Feeder Cattle (FC) contract is for 50,000 pounds of steers weighing 650-849 pounds each and graded as medium-large frame #1-#2 muscling, cattlemen can utilize the FC futures to hedge calves and feeder cattle of all weights and sexes. The key is knowing the basis between what will be sold and the FC contract. It is exrememly rare for cattle producers to have exactly 50,000 pounds of calves to sell. As a result, the difference in the actual pounds marked versus the pounds covered with an FC contract(s) will be overor under-covered. The number of calves required to fill one FC contract at various delivery weights is shown in Table 2. A word of caution: Potential hedgers are encouraged to estimate as closely as they can the number of contracts they will need. More often than not, it is better to have more cattle than contracts. For instance, if one estimates that he/ she will be selling 65,000 pounds of calves, it is better to have only one FC contract, not two. Table 2. Number of Cattle Required to Make 50,000 Pounds at Various Animal Weights

Sale weight	Number of head covered by one
(lbs)	futures contract
500	100
550	91
600	83
650	77
700	71
750	67
800	63
850	59

### Locking-in a Feeder Cattle Price Through a Hedge

ow is a price locked-in? Recall, the hedger takes an opposite position in the futures market from the cash market. In this case, the hedger would sell the number of contracts needed to cover the number of feeder cattle to be forwardpriced. The hedger is in effect "pre-selling" the cattle in the futures market. Assuming the hedger wishes to price a group of 65 feeders weighing 750 pounds in April<sup>1</sup>, one futures contract will be sold. By contacting a broker and placing an order to sell one April FC contract at \$175/cwt, the hedger has an approximate forward-price on the 65 head to be sold in April for \$165/cwt (\$175/ cwt plus the -\$10/cwt estimated basis). For this example, the two major costs of hedging—brokerage commissions and interest on the *initial margin* (good faith money)—are ignored.

Now, fast-forward to April. The hedger's cattle are ready to sell either at the local auction market or by some other method. For illustration purposes, the local auction market will be used. The producer takes the cattle to the local market and on the same day buys back the futures contract. The broker notifies the producer that he/ she has bought a contract at \$180/cwt while the price on the cattle was \$170/cwt at the stockyards. What has happened to the forward-price?

*Initial margin:* margin required, per contract, before a potential trader can be involved in buying and selling futures contracts for a commodity. A margin is a performance bond.

*Margin call:* monies that must be sent to the brokerage firm to maintain a futures position when the market is moving against the trader's position.

*Maintenance margin:* the minimum amount of equity that must be maintained in a margin account.

<sup>1</sup> A feeder cattle futures contract is 50,000 pounds, and the hedger is only hedging 48,750 pounds. The hedger is essentially speculating on the 1,250 pound difference. However, there is less risk in speculating on 1,250 pounds than on 48,750 pounds. The following illustrations do not account for this difference when calculating the net price received.

Rising Prices				
Date	Cash Market	Futures Market	Basis	
November 15	Expected April cash price = Futures price + (basis) \$175/cwt-\$10/cwt = \$165/cwt	Sold 1 Apr FC Futures @ \$175/cwt	-\$10/cwt (expected)	
Apr 15	Sold 65 head of cattle at local market for \$170/cwt	Bought 1 Apr FC Futures @ \$180/cwt	-\$10/cwt (actual)	
		Futures Results: Sold \$175 Bought \$180 Loss of \$5/cwt		

Net Price Received = Cash Price + futures gain or loss Net Price Received = \$170/cwt - \$5/cwt futures loss=\$165/cwt

The hedge resulted in a net price of \$165/ cwt. The gain in the cash market (\$170/ cwt actual cash price - \$165/cwt expected cash price) was offset by the loss in the futures market (\$175/cwt sale in November - \$180/cwt purchase in April), providing the expected price of \$165/cwt. Had the producer not hedged, he/she would have received a higher net price, but if that had been known in November, why forwardprice? In fact, if the hedger knows which way prices are going, why raise cattle? Just speculate in the futures market and forget about all the production risks.

What would have happened if prices had fallen between November 15 and April 15?

Falling Prices				
Date	Cash Market	Futures Market	Basis	
Nov 15	Expected April cash price = Futures price + (basis) \$175/cwt-\$10/cwt = \$165/cwt	Sell 1 Apr FC Futures @ \$175/cwt	-\$10/cwt (expected)	
Apr 15	Sold 65 head of cattle at local market for \$155/cwt	Bought 1 Apr FC Futures @ \$165/cwt	-\$10/cwt (actual)	
		Futures Results: Sold \$175/cwt Bought \$165/cwt Profit of \$10/cwt		

Net Price Received = Cash Price + futures gain or loss

Net Price Received = \$155/cwt + \$10/cwt futures gain = \$165/cwt

Again, the hedger received the \$165/cwt expected price even though prices fell after the hedge was placed in November. Why? Because the loss in the cash market (\$155/ cwt actual cash price - \$165/cwt expected cash price) was offset by the profit in the futures market (\$175/cwt sale in November - \$165/cwt purchase in April), giving the hedger the expected price of \$165/cwt.

Note two things from this example: On November 15, the expected cash price was estimated using the current futures price and the expected basis. Second, the net price received equals the expected cash price. In other words, the hedge locked-in an exact price, resulting in a perfect hedge. Regardless of which direction prices go, as long as the basis is estimated correctly, the hedge will lock-in the expected price.

What happens when the actual basis is different from the estimated basis? The following "basis error" example illustrates this situation.

Basis Error				
Date	Cash Market	Futures Market	Basis	
Nov 15	Expected April cash price = Futures price - (basis) \$175/cwt-\$10/cwt = \$165/cwt	Sell 1 Apr FC Futures @ \$175/cwt	-\$10/cwt (expected)	
Apr 15	Sold 65 head of cattle at local market for \$153/cwt	Bought 1 Apr FC Futures @ \$165/cwt	-\$12/cwt (actual)	
		Futures Results: Sold \$175 Bought \$165 Profit of \$10/cwt		

Net Price Received = Cash Price + futures gain or loss Net Price Received = \$153/cwt + \$10/cwt futures gain = \$163/cwt

What has happened? The cash price received in April at the local auction was actually \$2/cwt lower relative to April futures than expected; hence, the net price received is \$2/cwt lower than the expected cash price (\$153/cwt vs. \$155/cwt). Notice, this is the same difference as the estimated -\$10/cwt basis on November 15 and the actual basis of -\$12/cwt on April 15.

The take-home message is that hedging locks-in an exact price as long as the estimate of the basis is correct. However, in most practical situations there will be a difference between the actual and estimated basis. The net price and expected price will differ by the error in estimating basis. For the example, a cattle producer's hedge was considered. The hedge works the same way for all commodities. To establish a price, a hedger "pre-sells" or sells the number of future contracts to cover the amount of production needed to hedge. Then, when the hedger is actually ready to sell the production, the futures contracts are bought back. The hedger will receive the expected hedge price, plus or minus the amount of estimated basis error.

### Using Futures To Pre-Buy Inputs

n addition to pre-selling, livestock producers may be interested in pre-buying feed. Stocker operators, feedlots, or packers may also be interested in prepricing cattle that they will be purchasing later.

Pre-buying using futures contracts has several advantages. For example, producers can hedge their purchases of inputs over time to match when the inputs are needed in production. By using futures contracts, a hedger can establish purchase prices, subject to fluctuations in the basis from month to month, without tying up money over several months. Futures contracts also allow producers to pre-buy inputs without having to store them. This allows producers to use capital for things other than grain bins or additional cattle handling facilities.

When hedging an input, the hedging process is similar to the previous discussion. To hedge something that will be purchased later, for instance, corn or soybean meal, a hedge is established by pre-buying or buying futures contracts. When the input is actually purchased in the cash market, the futures contracts are sold. In this manner, any gain or loss in futures market prices will be offset by a gain or loss in the input's cash market. The actual price paid for the input will miss the original target price of the hedge by the amount the actual basis differs from the estimated basis.

Buying hedges may be motivated by:

- 1. the belief that the input's price will be higher later,
- 2. their use to improve management decisions, or
- their use to lock-in total profits by combining buying and selling hedges.

No matter what the commodity, the buying

hedge is simply a reversal of the futures and cash market actions used for the selling hedge.

### A Buying Hedge Example

Suppose it is July 1 and a livestock producer needs 5,000 bushels of corn four months from now. Since a November corn futures contract is not available, the producer checks the December corn futures contract (remember to select the futures contract month that matures closest to, but not before the corn is needed) and finds the December corn futures contract is trading at \$5 per bushel (bu). The producer must adjust the futures price by the anticipated basis in November.

If the estimated November corn cash price is \$0.50/bu more than the December corn futures price, a \$5/bu December futures price means corn purchased in the cash market in November will be about \$5.50/ bu (\$5/bu + 0.50/bu estimated basis). Assume the producer locks-in this price with a hedge, pre-buying November corn in July. To set an expected price in the futures market, buy the appropriate number of December contracts in July for the amount of corn planned for purchase on the cash market in November. The following accounts show the actions and results of three different situations using the buying hedge.

Notice, in each situation the net price paid equals the expected price, as long as the basis has been estimated correctly. When prices rise after the hedge is locked-in, a profit in the futures market is offset by the higher price paid for the corn in the local market. Alternatively, if prices fall after the hedge is locked-in, a loss in the futures market is offset by the lower price paid for corn in the cash market. The loss in the futures market results because the hedger must sell the futures contract back at a lower price. The basis error section shows the expected price will equal the net price as long as the basis has been estimated correctly.

Rising Prices With a Buying Hedge				
Date	Cash Market	Futures Market	Basis	
July 1	Expected November cash price = Futures price + (basis) \$5.00/bu +\$0.50/bu =\$5.50/bu	Buy 1 Dec Corn Futures @ \$5.00/bu	+\$0.50/bu (expected)	
Nov 15	Buy 5,000 bushels of corn locally for \$5.75/bu	Sell 1 Dec Corn Futures @ \$5.25/bu	+\$0.50/bu (actual)	
		Futures Results: Bought \$5.00/bu Sold \$5.25/bu Profit of \$0.25/bu		

Net Price Paid = Cash Price - futures loss or gain Net Price Paid = \$5.75/bu - \$0.25/bu futures profit = \$5.50/bu

Falling Prices With a Buying Hedge				
Date	Cash Market	Futures Market	Basis	
July 1	Expected November cash price = Futures price + basis \$5.00/bu +\$0.50/bu =\$5.50/bu	Buy 1 Dec Corn Futures @ \$5.00/bu	+\$0.50/bu (expected)	
Nov 15	Buy 5,000 bushels of corn locally for \$4.75/bu	Sell 1 Dec Corn Futures @ \$4.25/bushel	+\$0.50/bu (actual)	
		Futures Results: Bought \$5.00/bu Sold \$4.25/bu Loss of \$0.75/bu		

Net Price Paid = Cash Price - futures loss or gain Net Price Paid = \$4.75/bu - (-\$0.75/bu futures loss) = \$5.50/bu

Basis Error With a Buying Hedge			
Date	Cash Market	Futures Market	Basis
July 1	Expected November cash price = Futures price + basis \$5.00/bu +\$0.50/bu =\$5.50/bu	Buy 1 Dec Corn Futures @ \$5.00/bu	+\$0.50/bu (expected)
Nov 15	Buy 5,000 bushels of corn locally for \$4.50/bu	Sell 1 Dec Corn Futures @ \$3.75/bu	+\$0.75/bu (actual)
		Futures Results: Bought \$5.00/bu Sold \$3.75/bu Loss of \$1.25/bu	

Net Price Paid = Cash Price - futures loss or gain

Net Price Paid = \$4.50/bu - (-\$1.25/bu futures loss) = \$5.75/bu

Notice in this instance, the higher price is not caused by hedging, but rather by inaccurately estimating the basis.

### What If 5,000 Bushels Of Corn Is Not Needed?

One potential limitation to using corn futures to manage input price risk is the minimum contract size of 5,000 bushels. For many small- and medium-size livestock producers, the 5,000-bushel contract size may be larger than they need.

A useful alternative to a corn futures contract is the mini-corn futures contract. Mini contracts are offered for corn, soybeans and wheat. They afford the same protection offered by the "full-size" contracts, but in 1,000-bushel contracts rather than 5,000 bushels.

The specifications and margin requirements for the various grain and oilseed contracts are presented in Table 1, and on the CME Group website (<u>http://www.cmegroup.com/market-data/delayed-quotes/commodities.html</u>).

# **Hedging Summary**

edging is a way to transfer the price risk of selling or buying a product to those who look to profit from this risk (speculators). It is a way to preprice something produced, stored or that will need to be purchased. When used properly, it can be a flexible pricing tool for Tennessee producers to control the price risk they must deal with in today's agricultural markets.

#### Use the following steps when a forwardpricing decision is to be made:

- Determine the cost of production. This is the only way to determine whether pricing opportunities are profitable. There are two ways to lock-in prices: 1) futures contracts or 2) forward contracts.
- 2. Localize the futures price by determining local basis for the time, place, quality, and quantity in which the product will be sold or input purchased. Compare these prices to cash contract prices available at the same time.
- 3. Determine the risk of producing or purchasing an unpriced commodity. For instance, how high or low could prices be when the product is sold or purchased? Can a producer afford the risk of a price at the lower/higher extreme for selling a product (purchasing an input)?
- 4. Develop a pricing plan based on the above steps and stick to it. Changing plans in midstream usually results in eventual dissatisfaction with forwardpricing.

#### If a producer decides to manage price risk through the futures market, remember these precautions:

- 1. Margin money must be available to hold a hedge.
- 2. Do not let a broker make pricing decisions. Use his/her information and advice, but remember, only the producer can decide what is best for his/her operation.
- Do not combine hedging and speculation. Keep separate accounts for hedging and speculating. No one ever lost a farm through true hedging—many have through speculation.
- Do not hedge until the process is fully understood. Potential hedgers can "paper" trade until they completely understand the hedging process.
- 5. Do not hedge until the local basis is investigated and understood.

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