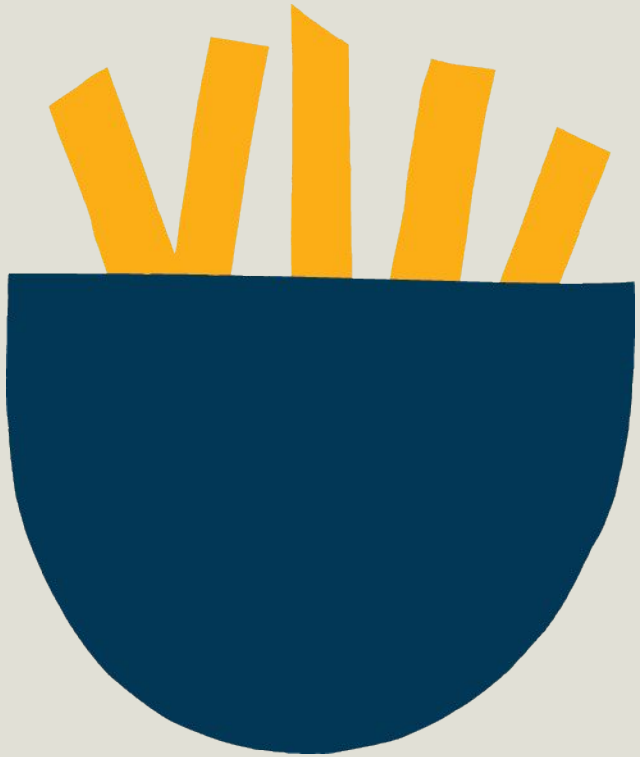
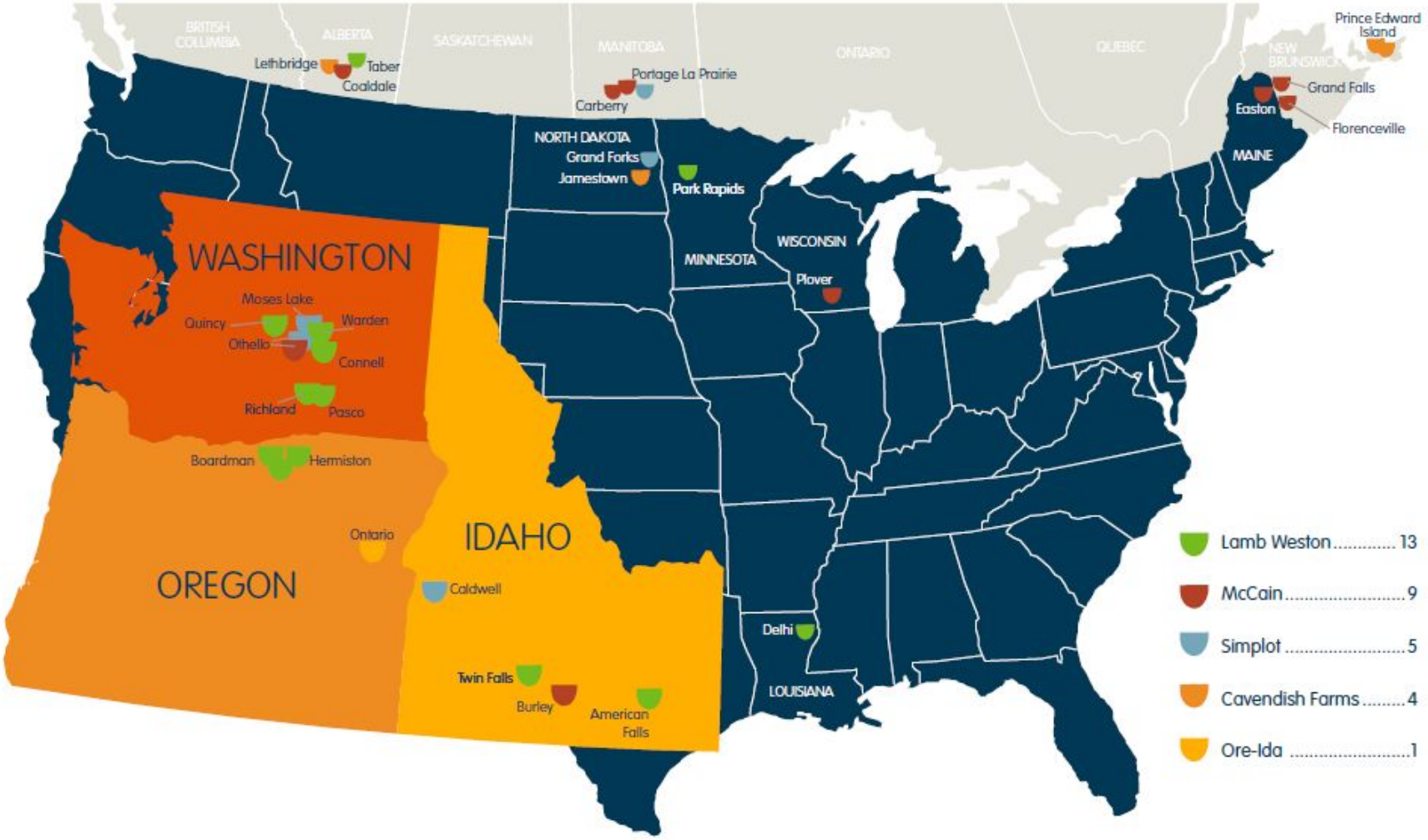
Potato 101



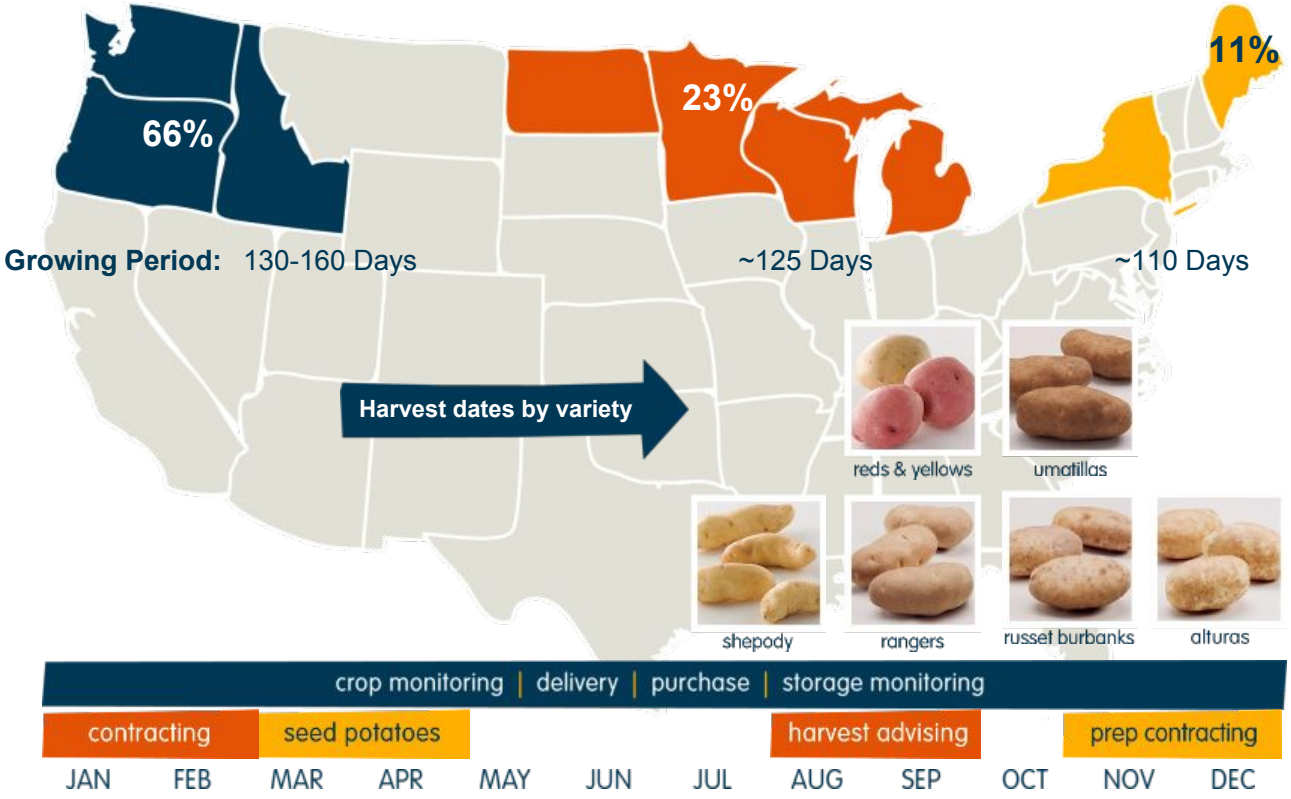
North American processing plants

LambWeston
SEEING POSSIBILITIES IN POTATOES



Primary Growing US Regions

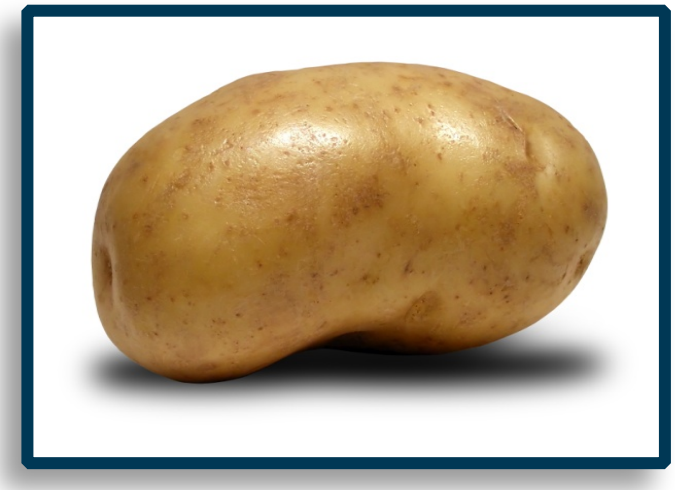
White potatoes, fall production. Note: Long NW growing season



Source: Internal estimates, US & Canada

Ideal growing conditions for potatoes

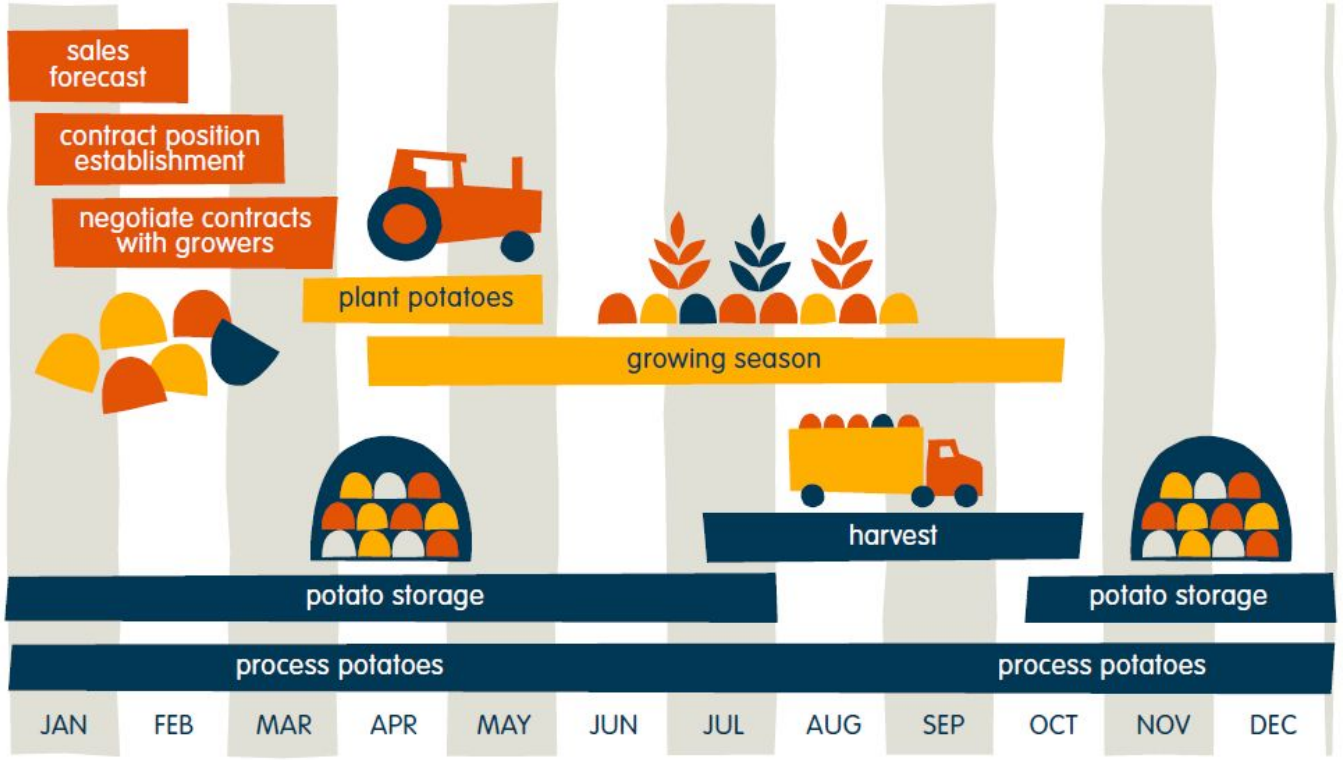
- Rich soil
- Hot days
- Cool nights
- Low rainfall
- Low humidity
- Long growing season



Northwest offers ideal potato growing conditions

Region	Soil Type	Temperature	Rainfall/ Irrigation	Humidity	Growing Season
NW	Loose volcanic ash & desert soil has right combo of nutrients & permeability for potatoes	Hot days, cool nights encourage transfer of starch & carbohydrates for bulk & high solids	Low rainfall, extensive irrigation allows for controlled moisture levels which reduce plant stress	Low humidity. Dry climate reduces fungus and other disease	Long growing season allows crop to recover from excess rain, excessive heat or wind
MW	Clay & Sand results in less than optimal drainage & nutrients	Hot days, warm nights can limit potato solids and increase disease	Irregular rainfall which, in the absence of irrigation, can result in variability	High humidity encourages vine fungus	Long growing season, but lower light intensity
NE	Rocky soil causes bruises, defects and problems in storage	Hot days, warm nights can limit potato solids and increase internal disease	Irregular rainfall which results in variable crop quality	High humidity encourages vine fungus	Shorter growing season limits plant's ability to produce tubers

The raw product cycle



Why manage potato quality attributes?

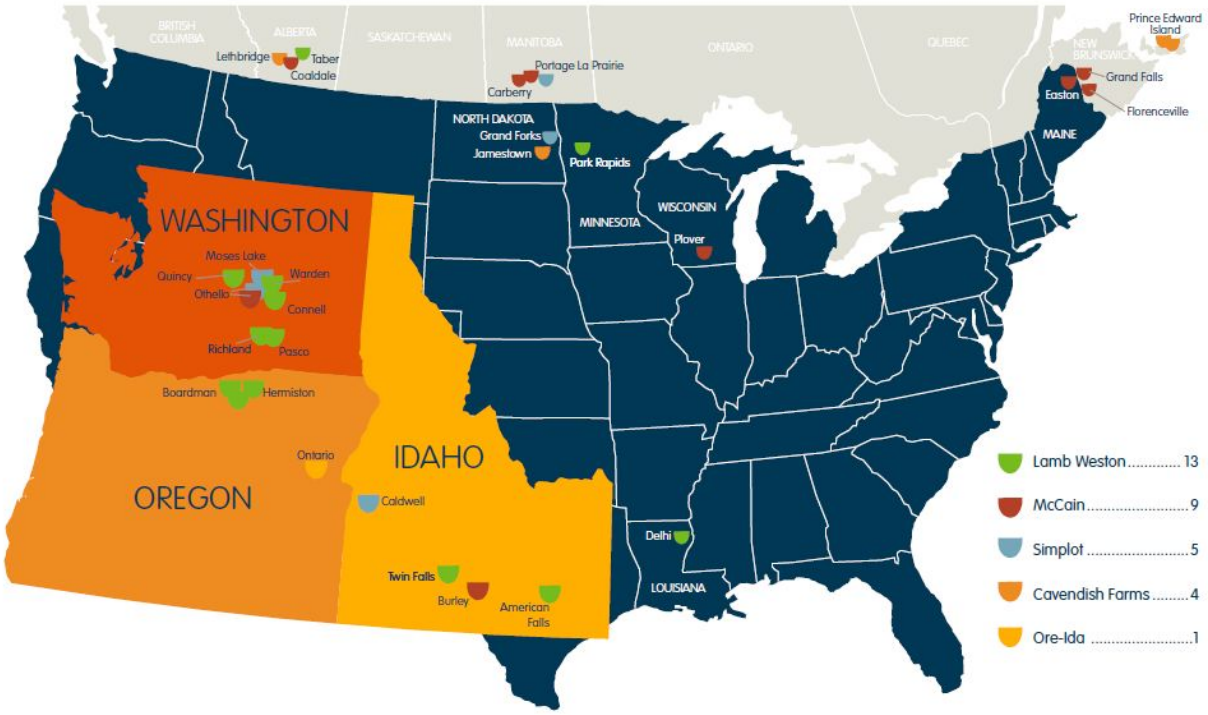
Size and Shape: Size impacts product length, yields and recovery. Things that affect potato size and shape are: Proper seed planting/spacing, controlling irrigation and fertilizer application maximizes potato size, shape and yield. Uncontrollable: Erratic weather- warm nights, excessive heat, overcast weather, and length of growing season.

Natural Sugars: Natural sugar impacts finished product color, yield, labor and energy costs. Natural sugar development can be minimized by controlling inputs, mother nature cooperating maximizing ideal growing conditions, and completing harvest in a timely manner. Things that affect natural sugar levels: Growing conditions- high winds, warm nights, humidity, overcast weather, rain and erratic weather.

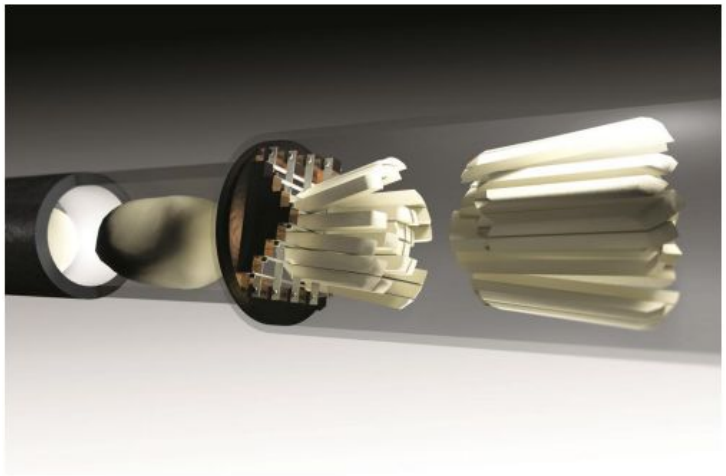
Specific Gravities: The specific gravity or % solid content of raw product affects textural quality, recovery, energy usage and oil usage. Things that affect specific gravities are: Growing conditions-Warm nights, excessive heat, humidity, overcast, rain, and erratic weather. Grower controllables are: Mother nature cooperates maximizing ideal growing conditions, along with controlling irrigation and fertilizer application. Proper crop rotation and field preparation is essential.

Defects: Potato Blemishes impact finished product defect levels, recovery, and labor. Things that affect defects are: Growing conditions- Warm nights, excessive heat, humidity, overcast, rain, and erratic weather. Grower controllables are: With proper crop rotation and seed selection, potato diseases and pest infestations can be minimized. Managing harvest, assuring there are proper moisture levels in the soil during harvest along with monitory pulp temperatures will minimize defect levels. Managing potato drops during harvest, unloading and loading will minimize bruise on the potato. Proper storage management is essential.

Northwest advantage



Water gun knife



1960
Lamb Water Gun Knife

Uses high-velocity water flow to send potatoes through stationary slicing blades, a process that is still the industry standard today.

1983
Automatic Defect Removal System

Removes critical and major defects on high speed production lines, revolutionizing the fry industry.

Processing: Defect Sorters

Alignment Shakers: Product is transferred over to the alignment shakers . These shakers are located just prior to the sorter and ADR belts. These shakers align the fries lengthwise and allow for proper separation of the fries into the sorters and the ADR's.

Sorters: Once fries are properly aligned, they transfer through the sorter where a series of cameras look at individual strips and decide if the blemish on the strip is considered a defect . This strip is then removed from the line by a puff of air. The basic operation is to sort the good fries from the bad. It's critical that operators and maintenance teams maintain the equipment. In order for the machine to function properly the lights and cameras must be kept as clean, this will allow the system to distinguish between the fries and the belt. It's important that all of the air nozzles are in place and functioning properly, and the air filters are clean. The drop out chute must be adjusted properly assuring the equipment separates the good and bad fries.

Quality Attributes

Grading categories

DEFECTS	TEXTURE	SOLIDS	LENGTH	COLOR
imperfections caused by disease, rot, or handling	both internal and external---dry and mealy inside, crisp and dry outside	ratio of starch and oil versus water in the potato. High solids contribute to better yields and better texture	based upon percentage of strips/pieces/fries that meet a specific length	after proper cooking

Grade levels

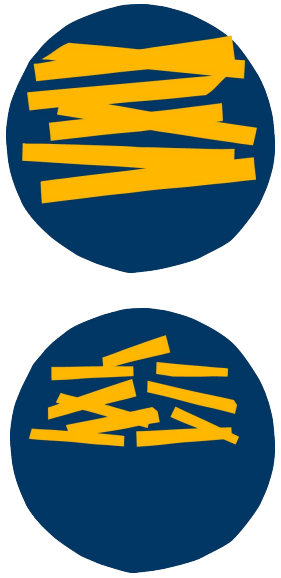
PXLF---Premium Extra Long Fancy

XLF---Extra Long Fancy

LF-Long Fancy

FA - Line Flow

B -Grade



Purpose of grading is to meet customers' needs and plant capabilities

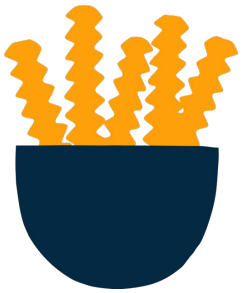
- XLF, LF, MA have minimum standards set by USDA resulting in industry wide consistency
- PXLF and FA are industry standards and therefore vary from packer to packer

Not All Fries Are The Same

Ultimately, French Fries Are:

- Very important to Operators, Consumers and YOU, the TM!
- One of the most **profitable** items on the menu (**operator**)

- The most **popular** food across ALL generations (**consumer**)
- Customizable (**operator & consumer**)



- A creator of **menu variety** because not everyone's favorite fry is the same (**operator & consumer**)
- Able to **drive profits** with yield and menu diversity (apps bring 2.5x profit than sides) (**operator**)

- The **one item** that can "**stop the truck**" (**TM**)
- A way to get your "**foot in the door**" (**TM**)

Length: Longer Fries = More Servings

Key Insight: Even though the product weight is the same, premium fries have longer length, which means greater plate coverage and more servings.

What Affects Yield?

- Length
- Cut size
- Cut style
- Solids
- Handling
- Serving vessel

Par-Fried vs Re-Fried

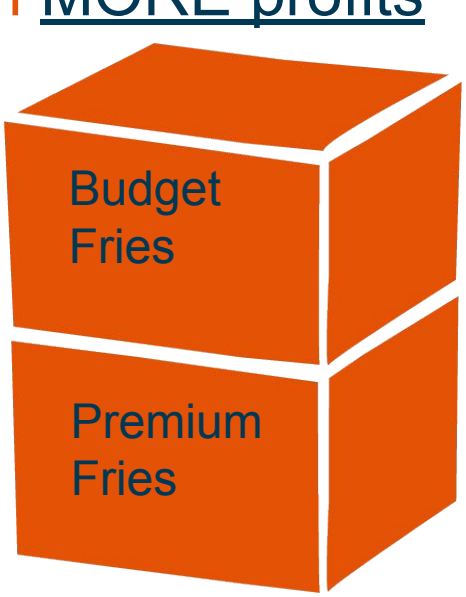
- Recovery Weight
- Physical Appearance

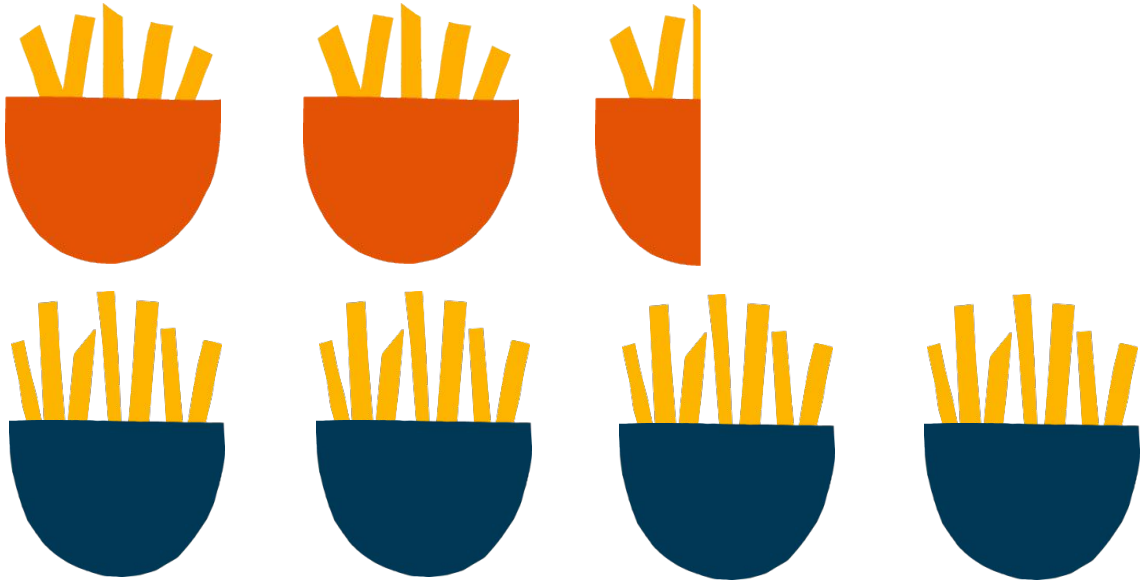
Solids Impact Yield

Fewer potato solids = fewer servings per case

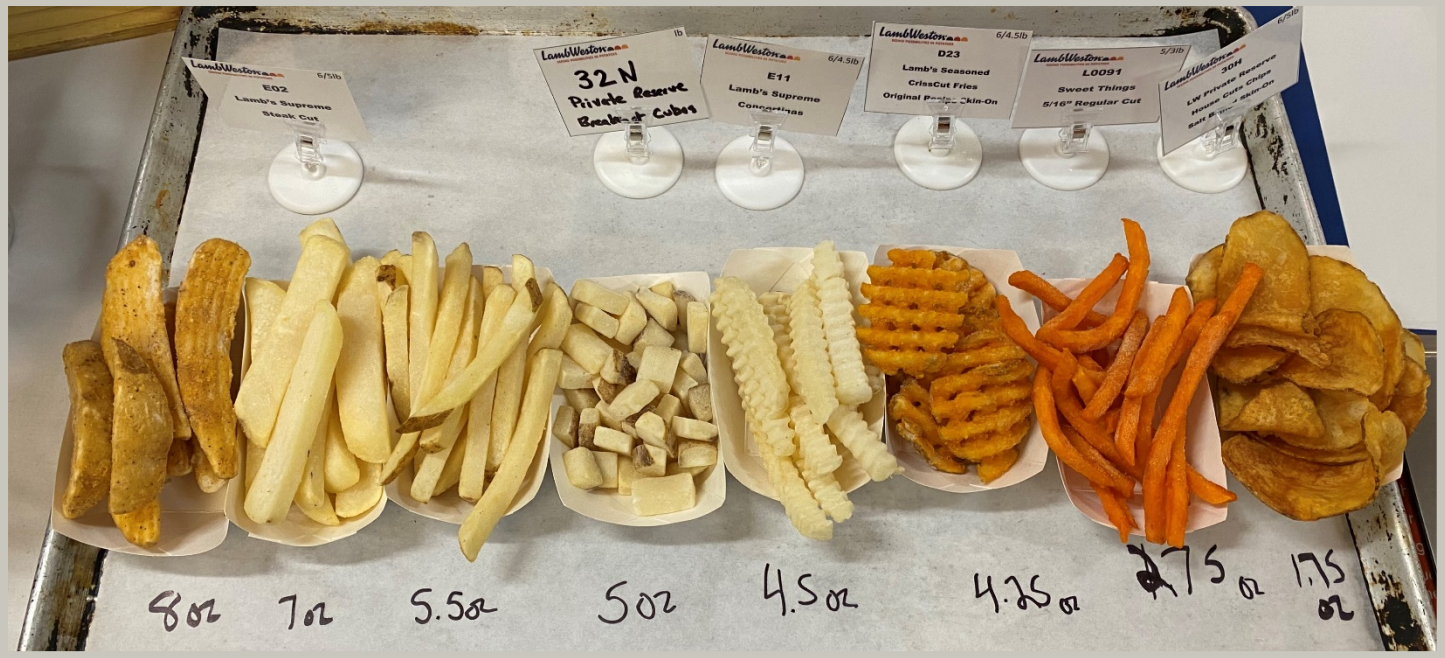
Operators **BUY** by the case but **SELL** by the portion

Premium fries produce MORE servings per case which results in MORE profits





Thinner & Specialty Cuts Require Less Weight to Fill the Plate



What Effects Yield?

- Length
- Cut size
- Cut style
- Solids
- Handling
- Serving vessel

DEMO

Serving Vessels

- **Vertical** containers consistently out-yield horizontal ones
- **Container tapering** helps increase yields
- More “upscale” than QSR sleeves
  - **Infinite shapes**/styles
  - **Inexpensive**-Doesn’t require expensive serving ware
- **Review portfolio for proper fry** – long, thin fries, specialty cuts, and chips yield better than shorter, thicker fries