Blending Canadian Whisky – A Review

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Political events and technological advances caused the evolution of blending Canadian whisky. The American civil war naturally created an environment for Canadian whisky to become popular. The distilleries in the United States closed their facilities and the Canadian distillers took advantage of the situation. Canadian whisky production became quite profitable. This led to government control over the distilling industry, which required meticulous record keeping by excise officers. Canadian distillers took the opportunity to invest in their own infrastructure by adding tanks, bottling, and ageing facilities. These technological advances naturally lead to blending recipes. Blending was simple at first, combining a prescribed number of barrels as per formula, but through industry regulation and innovation blending evolved to become a very precise science that considers grains, fermentation parameters, distillation method, cask type, age, and strength of alcohol.

INTRODUCTION

How does one learn to blend whisky? There is no specific school, training, or standard textbook that gives explicit instructions on how to make award winning whiskies. It traditionally has been a craft that has been handed down from one master blender to the next through storytelling. There is an art to understanding the combinations of flavours that work well together and when they become out of balance. It is about processing all the available information and putting it together to develop an exceptional blended whisky. A blender must understand consumer insights, inventory levels, costs, equipment capabilities, procurement, and the skill level of the human talents. A blender is central to whisky operations as the decisions made by the blender steer the long-term future of the company.

Canadian whisky did not intentionally start out as a blended style of whisky, nor does it have to be blended to be considered a Canadian whisky (Government of Canada 2022). As with many types of products, Canadian whisky evolved due to the circumstances that were happening in a specific era.

EVENTS THAT ADVANCED CANADIAN WHISKY BLENDING

In the early 1800s, rum was the choice of spirit for Canadians (Beaumont and Sismondo 2019). Canada was influenced by the British navy as it controlled much of the Caribbean territories which grew sugar cane. As the interior of Canada developed, settlers utilized local resources such as rye grain (*Secale cereale*) to make alcohol. Rye is capable of growing in the colder, harsher Canadian environment, and because of this, rye has become a staple of Canadian whisky blends today. However, most of the grain would have been imported from the United States at that time because much of the Canadian land was underdeveloped. Corn (*Zea mays*) would have been the main imported grain from the United States. Many of the producers from that era would have used corn in a mixed-grain mash bill (Table 1).

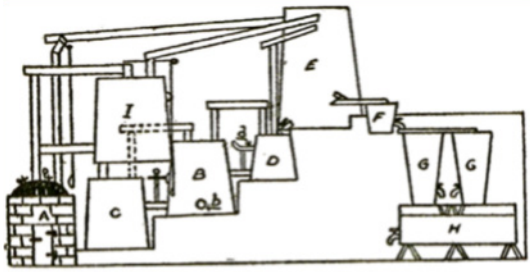
TABLE 1 Original Mash Bills of Canadian Whisky Producers (Parliament of Canada 1898; De Kergommeaux 2017).

PRODUCER	YEAR	CORN	RYE	BARLEY MALT	OATS
JP Wiser	1869	84	12	3	1
Hiram Walker	1883	78	17	5	—

PRODUCER	YEAR	WHEAT	WHEAT MIDDLINGS	BARLEY MALT
Gooderham & Worts	1830–40	10	83	7

Very early whisky producers in Canada would have sold a simple pot-distilled style of whisky in a ten-gallon cask (Figure 1). Basically, a consumer shows up to a distillery with a cask, and it would have been filled. The whisky was not aged for any length of time. A typical operational size for a Canadian distillery would not be more than 20 casks a day. Distillers knew that consumers preferred the lighter, smoother styles of whisky and not the heavier, full-flavoured, pot-distilled style of whisky. General hygiene and cleaning were an afterthought as the science of microbiology was in its infancy. It was not understood how microbial infections created undesirable off-odours which ended up in the whisky. Whisky was produced by the phase of the moon (Boruff and Wiener 1937), repeating the same processes over and over without knowing why.

FIGURE 1 Gooderham & Worts cooking and pot distillation system (Otto 1988).



A. Horizontal Boiler with central flue for burning wood.
B. No. 1 Still or preheater 4 ft. 7 in. x 6 ft. (b) pipe for charging from fermenters.
C. No. 2 Still 4 ft. 7 in. x 6 ft.
D. Doubler 2 ft. 7 in. x 3 ft. 8 in. (d) Low wines and Faints pipe.
E. Worm Tub 5 ft. 6 in. x 9 ft.
F. Spirit Receiver 2 ft. 2 in. x 2 ft.
G. G. Percolators filled with charcoal 2 ft. 6 in. x 5 ft.
H. Receiver for purified Spirit.
I. Warm Water Tank. for mashing—water, etc., connected by wooden pipes with steam boiler and top of worm tub.
Diameters stated at half depth.
All Pipes of wood.

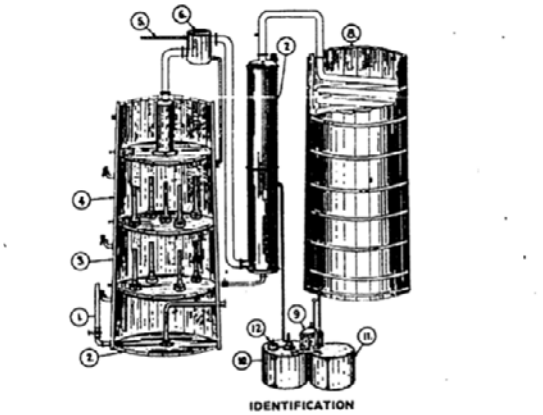
The only way producers could achieve lighter styles of whisky was to focus on methods of distillation. Various iterations of stills were developed by Hiram Walker (Figure 2). The use of carbon filtration systems, rectification, and multiple trays improved the taste profile of the whisky by eliminating off-odours. Precise operational control of the stills was the way to produce a consistent light-flavoured whisky. Distillers would market their products based on their precise distillation skills.

Since whisky was sold by the cask, blending would have been a limited activity as distillers would not have had the tank space or the technology to make complicated recipes (Parliament of Canada 1898). Records were not meticulously documented until the 1860s. Instinctively, blending could have been done to cover up off-flavours or to dilute batches, but there are no records that remain today to suggest this was a formalized practice.

The most significant historical event that transformed blending practices for Canadian whisky was the American Civil War (1861–1865). Whisky was the most popular drink in America at the time and a significant part of the US culture. The war caused existing distilleries to close as the men were required to fight in battles and the metal from the distillation equipment was required for guns and ammunition, and the grain and fruit were required for food. This left a need for a new whisky supply and the Canadian distillers took advantage of the situation (MacKinnon 2000). Adding to the demand, whisky was prescribed as a painkiller. The US government increased the tax revenue on US whisky production from $0.20 a gallon to $1.50 a gallon over four years to finance the war which created a financial incentive for Canadian whisky (Edwards 2015).

The 1860s were a great time for Canadian distillers. Investments were made back into whisky operations and advanced brewing and distilling technology. New copper receiving tanks, distillation equipment, and fermenting vessels were added to increase capacity. The Canadian authorities took notice and became highly involved in the distilling industry in order to control tax revenues and illicit distillation. Excise officers were assigned to each distillery to ensure alcohol production was controlled. This forced the distillers to document and record the entire business, because up to this point, production methodologies were passed along through story telling from owner to son. Distillers had to have a license, identify each piece of equipment, notify the government on the intent of trade, give notice when operations started or stopped, record grain purchased, and the amount of alcohol produced (MacKinnon 2000). By forcing distillers to make records, it created the framework for blending.

FIGURE 2 Hiram Walker three chamber charging still 1870 (MacKinnon 2000).



IDENTIFICATION

1. Spent Beer to Cattle Feed
2. 3rd Chamber
3. 2nd Chamber
4. 1st Chamber
5. From Beer Well
6. Beer Charger
7. Still Doubler
8. Worm
9. Try Box
10. Low Wines
11. Finished Product
12. Pumps

By 1871, Canada was producing more than five million gallons of whisky, of which more than half the volume was produced by Gooderham & Worts and Hiram Walker. The world suffered a long depression through the 1870s which caused metal and grain prices to sharply decline and increased competition between nations for

alcohol production. Nations took advantage of low metal prices to build railroads and the distilleries that were located in close proximity to the spurs had the advantage of new routes to markets, while those who were not near railway access ceased operations (Archives of Ontario 1872). Canada went from more than 150 distillers to 19 in a period of ten years. Nations, including Canada, put in place tariff systems to protect domestic alcohol sales as a measure to retain tax revenues. The five largest taxpayers in Canada were the whisky distillers Gooderham & Worts, Hiram Walker, JP Wiser, Henry Corby, and Joseph Seagram.

In 1878 the government imposed a form of prohibition at the municipal level, but it was only adopted for a brief time in twenty-five counties and two cities (Dawson 1895). The Canadian government's control over the alcohol industry continued, and by 1883 the Inland Revenue Act was adopted into law. Whisky and alcohol production was manufactured under bond, meaning the excise duty on a bottle of alcohol was not paid until the bottle was sold. The production of whisky had to be in bonded buildings or other secured areas in which dutiable goods could be stored, manipulated, or undergo manufacturing operations without payment of duty. It could be managed by the government or by private business. In the latter case a customs bond had to be posted with the government. This quickly shifted industry from ten-gallon wood keg sales to bottle sales. Strip stamps were applied across the top of the bottle to ensure the contents of the bottle, indicate the date of manufacture, and that it was produced under supervision of the Canadian government. This formalized branding and marketing within the Canadian whisky industry and started the whisky blending era (Livermore 2021).

FORMALIZED BLENDING

Definitions and regulations for whisky production evolved over time. The very first recipes were designed around the processes that were being used at the time which were very different from today's formulations. The oldest recipe book in the Hiram Walker archives is from 1886. Mash bills were used, and fermentations were set at 78 °F, much lower than modern temperatures of 90 °F. Fermentations finished at approximately 5% abv. It was distilled into a base whisky that was proofed on the Imperial proof strength (PS) scale, which is not the same as the standard US proofing system today. The proof scale system is based on over-proof (OP) and under-proof (UP) which is centered around 57.06% ABV which was known as the proof line or 100 percent proof strength. To determine the proof strength percent, it is 100 plus the over-proof percentage or minus the under-proof percentage. For example, the value of 25 UP would be 75 proof percent and 50 OP would be 150 proof percent. The percent proof scale ranged from zero (100 UP) to 166.7 (66.7 OP) at 60 °F (His Majesty Customs and Excise 1938).

Using the equation in Figure 3, the Imperial strength scale can be converted to percent ABV. If the strength is above 100 percent proof, use the overproof equation. If the strength is below, use the underproof equation.

FIGURE 3 Conversion calculations for Imperial proof scale to abv.

Over Proof: (100 + OP) × 0.5706 = % abv
Under Proof: (100 – UP) 0.5706 = % abv

For example, if the value of 25 UP was recorded in 1886, it can be converted to 42.8% ABV. Likewise, 20 UP would be 45.6% ABV, and 50 OP would be 85.6% ABV. The Imperial proof scale was used by Canadian blenders into the mid-1950s as a means of reporting strength of alcohol (Livermore 2021).

Non-whisky blending components were used in the 1886 Canadian whisky recipes (Hiram Walker Archives 1886). A black tea concentrate and a sugar syrup were the main two flavouring components (figure 4 and 5). The sugar syrup was mixed with boiling water to get it as thick as possible. It was cooled prior to use in recipes. The black tea was steeped in 25 UP whisky for 72 hours prior to use.

FIGURE 4 Sugar syrup recipe 1886.

SYRUP	
COMPONENT	**VOLUME (GALLONS)**
Granulated white sugar	1000 lbs
water	

FIGURE 5 Black tea recipe 1886.

TEA	
COMPONENT	**VOLUME (GALLONS)**
Black Tea	215 lbs
PS 25 UP	8000

Today the use of syrup or a black tea extract is not allowed in Canadian whisky, but at the time it would have been a novel concept that may have given Hiram Walker a competitive edge. If either of those components were used in today's recipes the spirit would be classified as a liquor or liqueur, depending on use (Government of Canada 2022).

The other ingredient of note that was used in 1886 was caramel colouring. Many of the whiskies added caramel to

the recipe to make the liquid appear darker. Caramel colouring has been a component to Canadian whisky from the very beginning and is not a new concept. It is only speculation, but it was probably added for the same reasons as it is today, to maintain consistency from blend to blend and to give a perceived premium quality. This would have been cutting-edge technology for the time period.

AGEING LAW

The Canadian government realized the importance of whisky to the economy and the overall financial stability of the government and became fearful from competition of other spirits from around the world. In order to protect the Canadian whisky category, the government implemented a two-year minimum age requirement for whisky in 1890 (today the Canadian whisky minimum age is three years). It was felt that ageing increased the value and image of Canadian whisky (Cloutier 1890). They also placed high tariffs on imported spirits in order to make Canadian whisky more affordable to the Canadian consumer.

Canada was the first country in the world to mandate a minimum ageing requirement for whisky. Such a condition applied twenty-five years ahead of the general mandates of the UK's Immature Spirits (Restriction) Act of 1915, and seventeen years ahead of the US Taft Act in 1907).

The UK was not aligned to ageing whisky at this time as it was thought it would prevent commerce and trade. It made Canadian whisky unique internationally. Canadian distiller George Gooderham was quoted, "there is probably no place in the world where purer or more wholesome liquors can be obtained than in Canada." However, there was strong opposition amongst Canadian distillers to the law as Franklin Walker (owner of the Hiram Walker distillery) argued, "The government made the lion's share without making any capital investment" (Dawson 1895).

Distillers had to increase barrel inventory, build warehouses, and increase tank capacity to handle all the liquid. This was adding capital for the same amount of whisky business. Because of the ageing requirement, it was the first time that distillers lost spirit in the cask over the two-year period. It was calculated that the government gained duty on evaporative losses, and it had to be reconciled. Perhaps this was the first time the angel's share within the whisky industry was documented. By the year 1900, Canadian whisky was the largest whisky category in the world.

At that time Hiram Walker had six basic recipes that were being made (Hiram Walker Archives 1886). It was not clear which brands the recipes were intended for, but each had its own unique formulation (Figure 6). Formulas were calculated on total volume, which in this case was imperial gallons.

Recipe design started with a base whisky of various proof strengths (PS) ranging from 25 UP to 50 OP. Interestingly, 50 OP would have been close to cask strength. Additional flavouring components were added to the base whisky to give a unique sensory profile. The recipes had interesting nuances; some had different spirit types such as rum or Scotch. Others had high wines (unaged whisky), plus the tea extract, sugar syrup, and caramel colouring. OF is an unknown component that was used in one blend. Caramel colouring was added and quantified by the naked eye. Instrumentation was not available to measure the hue of whisky in the 1890s.

The Old Rye 25 UP whisky was the most produced whisky for Hiram

FIGURE 6 The original Hiram Walker blending recipes.

OLD RYE – 25 UP	
COMPONENT	VOLUME (GALLONS)
PS 25 UP	10000
Tea	5
Rum	5
Syrup	10
Coloring	12.5

OLD MALT – 25 UP	
COMPONENT	VOLUME (GALLONS)
PS 25 UP	8000
Scotch Full Strength	160
Syrup	40
High Wines	20
Rum	1

FAMILY PROOF – 20 UP	
COMPONENT	VOLUME (GALLONS)
PS 20 UP	8000
High Wines 50 OP	160
Syrup	160

OLD BOURBON	
COMPONENT	VOLUME (GALLONS)
PS 20 UP	8000
High Wines 50 OP	640
Syrup	160
Coloring	3

OLD TODDY – 25 UP	
COMPONENT	VOLUME (GALLONS)
PS 25 UP	8000
Rum (Full Strength)	160
High Wines 50 OP	20
Syrup	20
Tea	5
Coloring	2.5

RYE – 50 OP	
COMPONENT	VOLUME (GALLONS)
PS 50 OP	400
Rum (Full Strength)	0.25
OF	5
Syrup	0.8
Tea	0.16
Coloring	0.25

Walker in the 1890s, and the brand still exists today as Hiram Walker Special Old Rye. As an estimation, most of the recipes flavour profile would be a light, smooth style of whisky with a hint of rye — which is traditional for Canadian whisky.

POST PROHIBITION ERA

Blending Canadian whisky blending advanced post-Prohibition and became more industrialized. Legislative bodies set standards for the Canadian whisky category. The tea extract and the sugar syrup were no longer permitted in blends to qualify as a Canadian whisky. Recipes from the 1940s onward did not use syrup or tea as blenders (Hiram Walker Archives 1944).

The use of a mash bill for Hiram Walker also started to change post-Prohibition. Grains were processed separately as much as possible. Corn would have been fermented separately, aside from the required barley malt for starch conversion; however, by the 1970s, distilleries would have moved to the use of enzymes from fungal fermentations for starch conversion instead of using barley malt. Eventually distillers moved to the commercially purchased enzymes that are commonly used today. Likewise, rye was fermented with the use of rye malt and barley malt, but eventually malt was removed for the preferable enzymatic conversion because of improved yield, flavour profile, and ease of use. Mixed grain mash bills would have been made for the purpose of a whisky flavouring component. A mixed grain mash bill has a heavy character which makes it a good blending component. Producers internally called this a bourbon which was understood as a mixed grain mash bill even though bourbon was more formally defined and protected much later by the US government.

The philosophy was to cook, ferment, distill, and age each grain separately and blend later (Livermore 2021). This is not required by law to be considered as a Canadian whisky, but this tends to be how most of the larger producers prefer to make whisky. It allows for flexibility for innovation and recipe design years later. If the grains were mixed together at the beginning, it becomes more difficult to change recipes later. Today corn, rye, wheat, barley, rye malt, and barley malt are types of grains that are processed separately.

Recipes evolved post-Prohibition by changing from the addition of ingredients on a volume basis to a percentage basis (Hiram Walker Archives 1956). Most recipes started by blending together a base whisky to a 100 percent level. Base whisky was considered one of three types of whisky: double distilled (DD) light corn whisky that was processed through a beer still and rectifying column, a mixed grain mash bill (bourbon) process through a single beer still, or a pre-blended whisky (blended together prior to ageing) that combined DD and a single beer distilled rye whisky.

After the base was blended, additional blending components were added to give character to the blend. This was kept in line with Canadian whisky tradition, but it was restricted to no more than 10 percent of the blend. Ingredients like American whisky, Scotch malt, Paxarette sherry, prune wine, vermouth, rum, or brandy. These ingredients were referred to as blenders and had to be at least two years of age in a wood cask or a wine. The order of addition was

FIGURE 7 Canadian whisky recipes from 1940s to 1980s.

1949		
100%	4-year Straight Imperial	
Add:	1/2 of 1% Std. Paxarette Sherry on Proof	
	40 lbs. Prune Wine to every 6000 Proof	
Reduce to 24.7 UP		
Colour to 18.75 of Series #52 on Lovibond's Tintometer		

1953		
100%	4-year Imperial	
Add:	7%	4-year Star Special
	1/2 of 1% Std. Paxarette Sherry on Proof	
	40 lbs. Prune Wine to every 6000 Proof	
Reduce to 23.9 UP		
Colour to 23.5 of Series #52 on Lovibond's Tintometer		

1957		
1.0%	1936 Star Special	
2.0%	1936 Imperial	
26.0%	1946 Whisky "CW"	
15.0%	1946 Whisky "MR"	
56.0%	1947 Corby's "C" Whisky	
Add:	2.5%	4-year Star Special
	2.0%	1946 "DG" Whisky (Dillinger Bbn) US
	1.0%	1946 "PB" Whisky (Plum Brandy)
	1.0%	1948 Walkerville Malt
	3.0% 1945 Whisky "C" US Redistilled 1951	
	3/4 of 1% Std. Paxarette Sherry on Proof	
	3/4 of 1% Prune Wine on Proof	

1958		
92.5%	3-year DD Whisky	
3.2%	3-year Star	
1.1%	5-year Walkerville Bourbon	
3.2%	3-year Star Special	
Add:	6.0%	1950 Peoria American Whisky "PG"
	1.5%	Std. Paxarette Sherry on Proof
	40 lbs.	Prune Wine to every 6000 Proof
	1.0%	1948 Walkerville Malt
Reduce to 30.0 UP		
Colour to 46% Transmission on Colorimeter		

1968		
100%	4-year DD	
Add:	4%	4-year Three Star Rye
	2%	4-year Walkerville Bourbon
	5%	1949 "C" Whisky (Corby)
		1/2 of 1% Std. Paxarette Sherry on Proof
		40 lbs. Prune Wine to every 6000 Proof
Reduce to 30.0 UP		
Colour to 44% Transmission on Colorimeter		

1979		
81%	15-year DD	
19%	15-year "CB" FB Whisky	
Add:	7%	2-year DD
	1.5%	Walkerville Bourbon
Reduce to 30.0 UP		
Colour to 44% Transmission on Colorimeter using 490 mm wavelength		

1989		
86.29%	6-year DD (25% rechar casks, 75% non rechar)	
9.55%	6-year Star Special	
4.16%	6-year Star	
Add:	2.5%	2-year French Grape Brandy
Reduce to 45.0% abv		
Colour to 185 Absorbance on a Spectrophotometer at 525 mm wavelength		

important to recipe design as the lighter ingredients (base whisky) were always added first and the heavier flavoured blenders were added last.

Recipe styles evolved through the 1940s to the 1980s (Hiram Walker Archives 1956). The use of different blenders changed, maybe because of the master Blender philosophy at the time, or because of ingredient availability, or simply changing consumer tastes (figure 7). Instrumentation started to be used for colour measurements. The details of whisky inventory became more of a concern in recipe design which started to include age, type of base whisky, distillation type, cask type, and grain type.

It should be noted that star refers to a rye that has been beer distilled, star special is a rye that has been beer distilled and then pot distilled, and Imperial is a pre-blended base whisky. This was the internal language used by the Hiram Walker distillery.

All the way to the 1970s the original proofing scale was used but switched to the more modern alcohol determination in the 1980s. Alcohol strength of the whisky which entered the cask was also a concern (figure 8). Evidence from the Hiram Walker archives shows that the master Blender was trying to optimize the flavour profile for a pre-blended whisky and a DD whisky (Hiram Walker Archives 1940).

FIGURE 8 Barrel entry strength of whisky 1912 – 1954.

IMPERIAL	
1912 to July 1939	@ 22.0 UP
August 1939 to October 1944	@ 0.2 OP
October 1944 to October 1948	@ 3.2 UP
October 1948 to May 1951	@ 11.0 OP
May 1951 to May 31, 1954	@ 16.0 OP
New Strength Adopted June 1, 1954	@ 10.1 OP

DD SPIRITS	
1929 to July 1948	@ 0.2 OP
July 1948 to May 1951	@ 10.1 OP & 11.3 OP
May 1951 to May 31, 1954	@ 16.3 OP
New Strength Adopted June 1, 1954	@ 11.0 OP

The range of alcohol for the barrel entry strength was from 44.5% ABV (22 UP) to 66.4% ABV (16.3 OP) over a 40-year period. Today the base whisky enters a barrel at 76% ABV and the rye flavouring whisky is at 58% ABV. The strength is adjusted with water prior to ageing as a DD whisky exits a still at 94% ABV, a beer distillation is 70% ABV, and a beer plus subsequent pot distillation is 80% ABV.

MODERN BLENDING

In the 1990s, the recipe construction changed slightly to align with the regulations. Recipes are now blended on a 100 percent scale, not blending the base whisky to 100 percent followed by the addition of the 10 percent blenders. In order to maintain the tradition of blending in two-year-old other spirits and wine, it was calculated that these components could not exceed 9.09 percent of the blend. A strange value, but it has a rationale. Adding together 100 percent plus 10 percent it equals 110 percent. Dividing 10 percent by 110 percent it is 9.09 percent, hence it has now become part of the Canadian whisky regulation (Government of Canada 2022). These components have to follow tradition and be at least two-years of age or wine, and not neutral grain spirits.

The design of whisky recipes changed to blend on a litre of absolute alcohol (LAA) instead of a classic percent volume scale (figure 9). The active and taxable ingredient in formulations is alcohol. Canadian whisky recipe design moved in the direction of LAA blending for ease of government reporting.

A second reason to blend by this method is for product consistency. Whisky formulations were becoming more complicated as the number of factors that influence

flavours needed to be considered to maintain product consistency. Most of the whisky industry recognizes that the strength of alcohol in cask will change over time, but it also changes inconsistently. The same batch of whisky aged in a different location in a warehouse, or in a different barrel type may yield differing strengths when drained several years later. For example, a barrel of whisky may start at 58% ABV but, after ageing the same batch of whisky in a different barrel, may range several percentage points (52% – 56% ABV) and have a different volume of liquid in cask after the process is complete because of evaporation losses. This may seem like a small difference but could have a major impact on the final flavour, especially when combining heavy flavouring whiskies with light base whisky. The current trends of rare releases and small batches magnifies the importance of blending consistency even further.

FIGURE 9 A typical blending recipe for a 10 000 L batch.

Star = column distilled

Star Special = column then pot distilled

DD = double column distilled (base whisky made of corn)

AB = Once used American Bourbon cask

If there is no description to the barrel type, then it is a used Canadian Whiskey barrel

Blend 40.0% abv

PERCENT LAA	COMPONENT	STRENGTH	TOTAL VOLUME	WEIGHT
63.91 LAA	DD — 10 Year	@ 70.2% abv	3641.6 L	3219.2 kg
15.00 LAA	DD AB — 11 Year	@ 66.7% abv	899.6 L	802.9 kg
8.50 LAA	Rye Star Special AB — 10 Year	@ 55.0% abv	618.2 L	568.1 kg
3.50 LAA	Rye Star AB — 10 Year	@ 57.2% abv	244.8 L	223.8 kg
4.50 LAA	Barley Malt Star Special AB — 4 Year	@ 57.3% abv	314.1 L	287.1 kg
3.00 LAA	Wheat Star NW — 6 Year	@ 57.8% abv	207.6 L	189.5 kg
1.00 LAA	American Bourbon	@48.2% abv	114.1 L	106.4 kg
0.59 LAA	Apera Wine (Paxarette sherry)	@14.6% abv	161.6 L	158.1 kg
	Water		3798.4 L	3798.4 kg

Each whisky in the blend is drained separately and checked for alcoholic strength. Depending on the blender's comfort level or tank availability, individual ingredients should pass a sensory panel. If it meets specification, the whisky is acceptable for blending. In the example of the 10,000 liter whisky blend in Figure 9, the total LAA adds to 100. Once each ingredient's LAA and strength is determined, the volume can be calculated.

First the total amount of the litres of alcohol in the 10,000 liter blend is calculated:

TOTAL ALCOHOL IN FINAL BLEND

$$\text{TOTAL VOL} \times \frac{\text{FINAL STRENGTH}}{100}$$

$$= 10000 \times \frac{40.0}{100}$$

$$= 4000 \text{ LAA}$$

The total amount of LAA of the first ingredient (DD – 10 Year) is calculated:

LAA OF FIRST INGREDIENT IN BLEND

$$\text{TOTAL LAA} \times \frac{\text{INGREDIENT LAA}}{100}$$

$$= 4000 \times \frac{63.91}{100}$$

$$= 2556.4 \text{ LAA}$$

Knowing the strength of the first ingredient, the total volume of first ingredient can be calculated:

VOLUME OF FIRST INGREDIENT BLEND

$$\text{LAA OF FIRST INGREDIENT} \div \frac{\text{STRENGTH FIRST INGREDIENT}}{100}$$

$$= 2556.4 \div \frac{70.2}{100}$$

$$= 3641.6 \text{ L}$$

When blending in very large batches, it is important to blend by weight, as blending by volume is influenced by the temperature of the whisky. Especially in a climate like Canada the temperature of the whisky in the ageing warehouse varies based on the season. Using predetermined density tables, the weight can be determined (Government of Canada 1980). The first ingredient has a strength of alcohol of 70.2% ABV, with the corresponding density of 0.88400 L/kg. Calculating the weight:

WEIGHT OF COMPONENT

$$\text{TOTAL VOLUME OF COMPONENT} \times \text{DENSITY OF ALC STRENGTH}$$

$$= 3641.6 \times 0.88400$$

$$= 3219.2 \text{ kg}$$

Following the same calculations as the first ingredient, the remaining components can be determined. The second-to-last ingredient that is added is reverse osmosis water. It should be added slowly and as sparingly as possible. For commercial sized blending, it is easier to adjust the strength of alcohol by adding water than by adding more alcohol. If the strength drops below the final strength

specification, then each ingredient will need to be added again in the exact proportion as the recipe prescribes. The tolerance of alcohol strength in Canada is plus or minus 0.3% ABV.

The last ingredient to be added is caramel colouring. Usually, the required caramel that is added is in the ppm range, therefore changing the alcoholic strength is not a concern.

CONCLUSION

How to blend, or at least the mathematical theory of blending, is the easy part. The precision has advanced over a century with the improvements in technology which have enabled the blenders to mix together many different types of ingredients. What to blend,is the difficult part.

A master Blender must have a keen understanding of the origin of flavours and how the flavours are manipulated in the whisky making process. Tools are available such as The Canadian Whisky Flavour Wheel™, which explains the three prime areas (grain, fermentation, and casks) where a blender can draw in flavours (Livermore 2017). The blender must also understand the marketing side of the business and determine the purpose of the whisky when designing the recipe. A project brief from marketing could include a one-time rare release that targets uisgephiles (whisky lovers) or connoisseurs, or the brief may ask that a whisky strategically be designed for cocktails, or the whisky could be for new consumers to the category. Each type of whisky would be very different. It is also important to understand the competition, costs, and inventory levels.

A master Blender must understand the equipment which manipulates whisky such as fermentation vessels, distillation units, condensers, and filtration units. One must understand the history of the distillery and be able to anticipate what may go wrong. Whisky can be prone to hazing or flocking which leads to product failure. It is up to the master Blender to be the keeper of history of all the information for the brand, distillery, and product design and must be able to determine the flavours that work well together and the flavours that clash. This can only be learned through experience and the best master Blenders will seamlessly teach their knowledge to the next generation by being a great storyteller.

For further information on the details of flavour development in whisky — The Canadian Whisky Master Class Volume 1 "The Keeper of History" and Volume 2 "Blending 101" (Livermore 2021). Accessed at jpwiserstour.ca

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