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Blending for Italian Espresso Part 2

A Practical Approach to Blending

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BLENDING FOR Italian espresso: It's a skill set that most roasters want to have at the ready, even if they're not using it every day. However, like so much else with roasting, blending for Italian espresso is extremely complex.

In Part 1 of this article (*Roast* magazine, Jan/Feb 2008) we developed some background information establishing the difference between brewed coffee and real espresso. In differentiating between brewed coffee and real espresso, we identified emulsification of oils in the ground coffee as the defining moment when coffee concentrate becomes an espresso and talked about the role of crema in capturing the aroma of fresh ground coffee and holding it in the cup. We also explained the limitations in the use of high-acid coffees in a quality espresso blend.

Here, we look more closely at the specific requirements of an Italian espresso blend by further developing the concept and creating a practical approach to its creation.

A Blending Philosophy

Acidity is not the only point of departure when considering espresso blends. The experts at Istituto Nazionale Espresso Italiano, Brescia, Italy, have spent considerable effort since 1998 to establish a set of standards for producing espresso Italiano and for the sensory characteristics of the resulting product. This was triggered by their feeling that, "espresso is one of the most copied products, typically with poor results." Their frustration can best be summarized in their statement, "Often the word espresso is used to evoke the Italian style and spirit and is associated to [sic] poor quality coffee blends or drinks which have nothing to share with that little cup able to offer a long lasting and superfine pleasure." Accepted descriptions of espresso, especially Italian espresso, call for low acidity; high body; ample, rich, velvety and persistent crema; reddish brown color; intense aroma and taste; and a long, pleasant aftertaste.

From these descriptions of Italian espresso,

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it seems clear that there is no single coffee, from any origin, that can provide all these physical and flavor characteristics in the correct balance. Thus, an acceptable espresso blend must be obtained by combining two or more coffees in the right proportions. There is a common belief that an espresso blend must comprise coffees from different origins. That is really not the case. It is more accurate to think that it takes more than one type and grade of coffee to make up a quality espresso blend. Origins such as Brazil, Indonesia and India are somewhat unique in producing different types and grades of high-quality coffee, making it possible to develop exceptional espresso blends using exclusively coffees from those respective countries. All three origins produce quality robusta and arabica that are low in acidity and high in body, as well as arabica that is flavorful to act as a highlighter in the blend.

Any blending attempt must logically start with cataloging the features of possible candidates in as detailed a fashion as practical. In the case of blending for brewed coffee, one would start with detailed "cupping notes" for each of the coffees. However, because oils have to be emulsified for it to become an espresso, and since these emulsified oils alter the physical and flavor characteristics of the beverage, conventional cupping data is of limited value for espresso blending. Instead, it is beneficial to develop corresponding data by pulling espresso shots with each candidate coffee and maintaining detailed notes regarding each of the parameters: body, color, crema (quantity, texture and persistence), acidity, aroma, taste and aftertaste.

Of these many characteristics, body, crema and color can be considered more physical in nature while others, such as acidity, aroma, taste and aftertaste can be considered attributes of flavor. If it is possible to bring the physical properties using one set of coffees, with little contribution to overall flavor, and the flavor properties can be controlled using another set of coffees that adds little to body and crema, then the blending process can be organized more simply and made more orderly. Although this is an easy principle to understand, it is much more difficult to achieve in practice. Nevertheless, one can come close with some acceptable compromises.

One side benefit of such an approach is to make it easier to balance the resulting blend. Using several coffees, all making comparable contributions to the various features used to describe the blend, results in changing many of these parameters when one component coffee is replaced or its relative proportion is altered. This makes balancing the blend a never-ending exercise, particularly if blend consistency is a high priority. Considering the physical and flavor characteristics as somewhat separable makes blend adjustment easier to manage.

Rebalancing the blend with each new coffee helps achieve consistency and quality. Not only should this occur whenever new crop coffee becomes available, but also when coffee from a different lot is added to the inventory. In addition, coffee from a given crop ages with time and changes bean characteristics, particularly acidity. In order to maintain blend consistency, it is necessary to adjust the blend, often during a crop year, to compensate for this aging effect.

Selecting a Base Coffee

A base in any espresso blend is the component that is present in the largest proportion, forming the foundation of the blend. It is best to choose the base to account for the physical properties, such as body, color and crema; and to defer the choice of acidity, aroma, flavor and aftertaste until the base is firmly established. Thus, I find that selecting the base coffee is the first step in the espresso-blending process. This is a serious departure from conventional blending for brewed coffee where a keen eye is kept on the final aroma and taste throughout the blending process. In selecting a base coffee, it is important to screen the coffees to ensure that they do not display any unpleasant aftertaste that is very difficult to camouflage later in the process.

Color is best controlled by the degree of roast of the base coffee. To achieve the reddish brown color that is most visually appealing, in my experience, it is best to limit the roast level to full city. It also helps to keep the beans just short of oiling. Roasting the beans dark makes the resulting brew black and turns the crema dark and unattractive. And roasting them to the point of oiling causes the oils to emerge to the

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surface, get oxidized and cause the beans to stale quickly. It also diminishes the amount of oils retained inside the roasted beans and available to be emulsified by the pressurized water to produce the all important crema.

In choosing a base, look for coffees that are low in acidity, high in body, produce copious amount of crema that lasts for a long time, and are relatively mute with respect to aroma and taste—or at least have aroma and taste that will not conflict with the coffees that are to be showcased in the espresso. Since natural and semi-washed coffees tend to be sweeter and to produce more crema than their washed counterparts, washed coffees are generally not prime candidates for the base of the espresso blend.

Natural and semi-washed coffees from Brazil are probably the coffees most commonly used in espresso blends, so much so that many roasters try to avoid them just to be different. Brazil is a good source of base coffees, especially when they are carefully selected for their characteristics. Indonesian coffees, particularly those from Sumatra, as well as coffees from India, provide a desirable combination of low acidity and high body. India's monsooned arabica is low in acidity, high in body, and produces copious amount of crema, making it somewhat ideal as a candidate for the base coffee in an espresso blend. The highest grade of this class is Monsooned Malabar-AA Super Grade.

The base coffee, by definition, will be the largest component in the blend. There are no hard and fast rules that define its relative proportions. The base can be as large as 60 percent of the blend or as small as 40 percent. It is not uncommon to use two low-acid, high-body coffees together to make up the base of a blend.

Should Robusta be Included in the Blend?

Having selected the base coffee(s), it is time to decide if a high-quality robusta would be suitable for the blend. The choice of

robusta beans to be used in the blend is determined, to a large extent, by the coffee selected to be its base. This robusta selection must be made by making espresso shots using an interim blend consisting of the robusta and the base coffees. Some robustas just do not work with certain base coffees.

While quality espresso blends can be made using only arabica beans, it is not prudent to avoid using robusta based solely on prejudice. Much of this prejudice in North America is derived from the commonly available grades of robusta that have an undesirable rubbery aftertaste. The specialty coffee movement in North America, in its founding days, took a stand that the avoidance of robusta usage would be the signature difference between specialty coffee and commercial grade institutional coffee. While that position is supportable in the context of brewed coffee, it is an unnecessary and undesirable limitation to impose it upon espresso.

Superior robusta is grown at high elevations that are also well suited for the cultivation of arabica. These high-quality robusta beans are picked and processed with the same care and attention as the finest arabica. They are hard to find and expensive, often costing more than many arabica beans.

Espresso quality can be enhanced using a premium robusta that is clean, soft and mellow. First, it adds to the caffeine content of the espresso for that "extra kick" most people look for in an espresso. In addition, a quality robusta has the ability to enhance the richness and persistence of the crema without detracting from the neutral character that is so critical for a superior espresso.

Uganda, Indonesia, Mexico and India are good sources of quality robusta for use in espresso blends. If a high-quality robusta is used in an espresso blend, its concentration is usually in the 10 to 20 percent range. The higher the quality of the robusta, the higher the concentration the blend can accommodate. The goal here is to take advantage of robusta's contributions without actually being able to taste it in the cup.

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Highlighter Coffee for Flavor

Having selected the base coffee and decided if a robusta is to be included in the blend, the third step is to select the highlighter coffee, whose aroma, taste and aftertaste will be showcased in the blend. Surprisingly, this is the easiest selection to make. This coffee is counted on to supply the flavor properties, and there is very little constraint placed on this coffee. It can be washed, semi-washed or natural; it can be somewhat acidic and low in body, but it has to be highly aromatic and intensely flavorful with a long and pleasant aftertaste.

The choice of flavor profile is a matter of personal preference. Only the roaster's imagination limits the use of a coffee as a highlighter coffee. Some popular coffees whose flavor and aroma are displayed in quality espresso blends include Ethiopian Harrar, Sidamo and Yirgacheffe; Guatemalan Antigua and Huehuetenango; Indonesian Sulawesi, as well as Yemen Moka and Matari.

The highlighter coffees are usually used in proportions ranging from about 20 to 40 percent of the blend. However, if highly acidic coffees, such as those from Kenya or Costa Rica, are used as highlighter coffee, their concentration should be strictly limited, as was discussed in Part 1 of this article.

TABLE 1. Shot-to-Shot Variation of Coffees in a Blend for Different Doses

	Dose = 7 grams Spread			Dose = 14 grams Spread			Dose = 21 grams Spread		
Blend Component %	+/- 10%	+/- 20%	+/- 40%	+/- 10%	+/- 20%	+/- 40%	+/- 10%	+/- 20%	+/- 40%
10	36	52	77	39	61	88	42	68	94
20	41	64	90	48	76	97	54	84	99
30	47	74	96	57	86	100	65	92	100
40	54	82	99	66	93	100	74	97	100
50	62	89	100	75	97	100	83	99	100

Table courtesy of Jim Schulman of the University of Chicago.

Balancing the Blend

This is the final step in the actual espresso-blending process and is probably the most demanding part of the whole procedure. It is definitely an art more than a science and calls for exceptional memory of flavor profiles of both the component coffees as well as those of past blends.

Being an agricultural product, the beans from a given coffee plant change from crop to crop. Thus, any espresso blend has to be adjusted and rebalanced at least once a year when the new crop becomes available. Actually, this process should be repeated several times a year, since all new crop coffees from all origins do not become available at the same time. In fact, this rebalancing of the blend will be performed more frequently as coffees change character as they age, with some coffees changing more rapidly than others.

The primary purpose of this step is to insure that all the features of the blend are in perfect harmony and no particular characteristic dominates the blend. The resulting espresso should glide smoothly down one's throat like a well-balanced and properly aged cognac. Unfortunately, this is an aspect that roasters in North America seem to miss; many American espresso blends I have experienced have at least one characteristic that stands out and "hits you right between the eyes." Usually it is the acidity that is most predominant, indicating either improper choice of coffees or erroneously carrying over concepts from brewed-coffee blending into espresso blending.

Another important aspect is to ensure that today's blend is consistent in texture and taste profile with yesterday's blend. If it is not carefully planned and managed, this step can become a never-ending process. Every time a new bag of coffee is included in the blend, the whole balancing process rears its ugly head. To help neutralize this problem, I recommend purchasing coffee directly from high-quality estates in large enough homogeneous lots to minimize bag-to-bag variations.

Acidity is the characteristic that changes the most as the coffee ages. By using mostly medium- and low-acid coffees in the blend, we also minimize this aging effect as the coffee is warehoused through the crop year.

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Statistical Considerations

In a café or espresso bar, regular customers know exactly how the espresso and espresso-based drinks should taste: exactly the way they tasted the last time they ordered them. Some customers are so particular that they will not order if their favorite barista is not staffing the counter. While that may be an indictment of the inconsistency of staff training programs, it goes to show that even with effective staff training, espresso blend stability, as well as shot-to-shot consistency, is of paramount importance.

Increasing the number of different beans used in a blend calls for more frequent blend adjustments. I have heard of espresso blends that have as many as nine different coffees in it. Except as a marketing gimmick, I do not believe such a complex blend is meaningful, since no one can really discern the effect of the last bean of the ninth coffee in the blend.

I have come across espresso blends that have three very similar coffees, e.g., three different Brazils used to make up the base of the blend. In such instance, replacing one bean of one Brazil coffee with one bean of another Brazil coffee in that blend makes little detectable difference, so why use three similar coffees in the first place? The only reason for this might be as a backup, in case one coffee becomes unavailable or there isn't enough of it; thus, one can be substituted for the other.

Besides, a complex multi-bean blend is a statistical nightmare when considering shot-to-shot consistency. We introduced the basic statistical calculations in the form of a table in Part 1 of this article (Jan/Feb 2008). In a side bar in that article, we explained in some detail, how to use that table. We have reproduced the same table here, but without the detailed explanations.

Let's look at an example using the accompanying table. Suppose you make a series of double shots using a multi-bean blend containing 20 percent of one particular coffee, say a Guatemalan Antigua. You see that the percentage of the Antigua will be between 18 and 22 (spread of +/- 10 percent about a mean composition of 20 percent) only 48 percent of the time. The other 52 percent of the time, the relative proportion is outside those limits.

So far, we have considered the effect of the variation in the bean count of only one coffee in the blend. That is the primary purpose of this set of calculations. But this table can be used to cover multi-bean blends with certain limitations. Suppose we have a two-bean blend, each at 50 percent. If we require that one of these beans be present in the 14 gram sample at a count of 56 beans with a variation of less than +/- 10 percent, the table shows that it will occur 75 percent of the time. Since the sample size is constrained to a total of 112 beans, the second coffee will automatically compensate for the variation in the bean count of the first coffee. Thus the second coffee will also be within the +/- 10 percent limit the same 75 percent of the time. However, as the bean count of one coffee is moving below the average count of 56 beans, the other coffee is moving above the average, thus doubling the ultimate effect on the blend.

We will require a different set of calculations to evaluate the impact on a three-bean blend, say with relative proportions of 50 percent : 30 percent : 20 percent (approximately 56 : 34 : 22 beans for a double shot) and those tables become more complicated. However, we can use the current table to see some of these effects. As we calculated above, the base coffee will be present within +/- 10 percent in 75 percent of the samples. Keeping the total number of beans at 112 means the other two coffees "combined" will be within +/- 6 beans (of the 56 bean total) also 75 percent of the time. However, this +/- 6 bean variation may all be in the 30 percent component (effectively 6 beans out of 34) or all be in the 20 percent component (equal to 6 beans out of 22) or somehow distributed between the two of them. In any case, the relative impact of this variation on the coffees that are smaller components of the blend will be proportionately much greater.

One simple way to overcome the statistical nightmare of a multi-bean blend is to simply grind the coffee and homogenize it soon after it is blended and take samples only from this large mass of the ground coffee. In that case, instead of dealing with 56 beans for a single shot or 112 beans for a double shot, one will be dealing with a much larger number of ground coffee particles in each sample. But there is a huge price to pay. When beans are ground, their surface area is immensely increased, by a factor of at least 100 by one estimate, greatly accelerating the staling process.

For a multi-bean blend, it really comes down to selecting between two bad choices: accept the shot-to-shot variation but keep the beans fresher, or minimize the variations but allow the coffee to stale.

Impact of Potency?

In our statistical considerations, we have only taken into account the variations resulting from the number of beans of

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each coffee present in a random sample of a particular size. But all coffees do not contribute equally to any given espresso property. Some coffees affect certain characteristics of the espresso far more than another coffee in that blend.

To account for those various impacts, one has to consider the "potency" of each particular coffee. A small variation in the number of a highly "potent" bean in a random sample can have a large effect on the ultimate flavor profile of the blend. Unfortunately, highly "potent" coffees tend to be employed in smaller proportions in the blend; thereby making even small variations have a proportionately high impact on certain espresso characteristics. This is particularly true of acidity, because acidic coffees simply cannot make up a large proportion of the blend.

Help Them Get the Best Out of Your Blend

Developing an exceptional blend is not enough; the roaster must also help the end user extract the very best espresso using that blend. In addition to all elements of "best practices" that apply to all espresso production, there is information that is unique to each espresso blend that the end user must be privy to. We consider it the responsibility of the roaster to develop those bits of information and transfer them to the end user. These include, among other items, roast date, optimum extraction temperature and specific water quality requirements.

It is important for the café owner to know when the blend was roasted. Different blends need different post-roast rest periods until they have sufficiently out-gassed for the blend to be usable. If used before they are properly rested, copious amounts of carbon dioxide rush out of the freshly ground coffee particles as soon as the hot water hits them. This prevents water molecules from penetrating the interior of the ground coffee particles. This results in a weak brew, with little or no flavor and no oil emulsification.

Different blends also reach the peak of their flavor over different elapsed times since roasting. Blends also stale at different rates. The café owner can manage the coffee stock a lot better if the actual roast date is known. Any roaster who does not post the roast date on the bag is not "telling the whole truth."

It is beneficial for the café owner to know the water temperature required for optimum flavor production. Some blends perform well at 195° F while some others are best at 202.5° F and still others require temperatures as high as 207° F.

A third element that is unique to the blend is the quality of the water required for maximum flavor production. Many café owners are aware of the need to "condition" the water prior to its use with the espresso machine. Most of the time, this treatment is done to protect the espresso machine from excessive calcium deposits rather than to produce the best tasting espresso. Several water quality parameters affect the flavor of the espresso and our experience shows the total dissolved solids (TDS) to be one of the more critical factors.

Practical Guidelines

Based on all of the considerations discussed above, here are some practical guidelines to assist in blending for Italian espresso:

- Select coffees by drawing espresso with them and making detailed notes on each coffee's behavior in an espresso environment.
- Use as few coffees in the blend as possible. Two, three or four coffees in the blend are sufficient in most cases. Using more coffees not only complicates the blending process but also adversely affects blend stability.
- If a coffee is to be included in the blend, use large enough proportions to make its impact felt. Using less than 15 percent of a coffee is not worth the added complication.
- Remember that small proportions of highly potent coffee give rise to large shot-to-shot variations.

Conclusion

Although blending for espresso is very different from blending for brewed coffee, espresso blending does not have to remain a mystery. The approach described in this article is not the only way to develop a blend; hopefully it provides a good starting point to venture into producing quality espresso blends. There is really no reason why the average espresso blend available in North America cannot improve to the point that an espresso prepared using that blend would in fact be drinkable as "straights." I've yet to be convinced that a poorly made espresso makes a better latte or cappuccino than a quality espresso. Happy blending!

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