EXARC JOURNAL 2024/2
13 Articles | Open Access

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Reviewed Article:

An Experimental Approach to Baking Ancient Roman Placenta

Persistent Identifier: https://exarc.net/ark:/88735/10749

EXARC Journal Issue 2024/2 | **Publication Date:** 2024-06-04

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Cato The Elder (234-149 BC) wrote our oldest extant work of continuous Latin prose, *On Farming* (*de agri cultura*), a how-to guide for farming and life that also included many recipes. We were interested in the section on bread recipes in this text, particularly the recipe for the complex, layered *placenta* due to its choice of ingredients and cooking techniques. We were

especially interested in the use of farro paste, an ingredient we had never seen used in ancient or modern cooking.

> Since Cato's placenta recipe makes a huge placenta (more than 26 pounds of ingredients), we scaled down the recipe in our initial experiments. For the tracta, we experimented with roughly 1/12 the original amounts...

Introduction

In order to better understand these ingredients and techniques, we attempted to systematically investigate and recreate these recipes. Cato wrote *on Farming* in about 165 BC, when professional bakeries and sourdough had only just come to Rome (Pliny, *NH,* 18.28), a change which must have affected Roman life at a fundamental level. It is intriguing to see the culturally conservative Cato the Elder advocating for this recipe that used native ingredients and techniques in the face of the cultural changes happening all around him.

On Farming is divided into 162 short sections, which are generally organised by theme. Sections 74-82 concern breadstuffs: section 74 supplies the recipe for a simple bread consisting of only flour and water; section 75 for a cheese-based bread of cheese, flour, and egg; and sections 76-82 for more complex breads centred around the dish *placenta*. We focused on this last category.

Cato's *placenta* recipe is comprised of alternating layers of a bread product called *tracta* and cheese filling, all encased in a dough. Cato begins the recipe with a list of ingredients for everything but the cheese filling[1]: "*Placenta* to be made thus: two pounds of wheat flour (*farina siligineae*) for the base, four pounds of flour (*farina*) and two pounds of highest-grade *alica* for the *tracta*."[2] Pliny the Elder, a first century AD naturalist, tells us that *alica* are grains of emmer wheat that have been crushed in a mortar twice: first to remove the grains from their hulls (becoming groats), and then to break the grains into chunks (Pliny, *NH,* 18.29). De-hulled emmer is called farro in grocery stores today.[3]

Step 1: Smashing the *Alica*

Cato continues the recipe: "put the *alica* into water. When it is very soft, put it into a clean mixing bowl and drain it well. Then work it into a paste by hand."

Cato does not specify how long the *alica* should be soaked, only specifying that the grain should be very soft (*bene mollis*) before proceeding. We submerged farro in cold water and let it soak uncovered. To find out if the farro was properly softened, we removed a few pieces from the water and squeezed them between thumb and index finger. After two hours, the grain still held its shape, and after five hours, the grain only flattened slightly. After nine hours of soaking there was a noticeable difference; the grain easily lost its shape and released white inner starches (See Figure 1). After 19 hours, the farro hit a point of softness at which further

soaking had no effect. For our bread-making experiments, we soaked the grain for a minimum of 20 hours.

We then drained the soaked farro. It is unclear how Cato intends one to then "work it into a paste by hand", since the Latin phrase "by hand" can mean to use a tool with one's hand or to use one's actual hand, and because the term for mixing bowl in Latin is the same term for mortar, *mortarium*.[4] This left us uncertain whether Cato is instructing the reader to crush the groats with their actual hand in a mixing bowl, or with a pestle "by hand" in a mortar. We explored crushing the soaked groats both ways. After five minutes of squeezing with our fingers, the individual grains broke down and combined to form a mass, with the crushed, soaked emmer groats releasing inner starches to create a stretchy white goo, which we will call farro paste. Darker pieces of the grain's coating, the bran, were suspended in the mixture, creating the appearance and texture of Rice Krispy treats (See Figure 2). This same texture was achieved in only one minute with a mortar and pestle. After five minutes in the mortar, the mixture was thicker than what could be created by hand, and the pieces of coating were smaller (See Figure 3). Since this seemed a more desirous texture, we crushed the soaked emmer groats in a mortar and pestle in our experiments.

Cato specifies using "highest-grade *alica* for the *tracta*," and Pliny the Elder tells us that the larger the pieces of smashed groat, the higher the grade of *alica* (Pliny, NH, 18.29). To investigate the importance of the size of the groats for this process, we crushed in the mortar both soaked whole emmer groats and soaked groats we had previously broken into smaller pieces with a mortar and pestle. Since the farro in both cases was then subsequently crushed to a paste, there was no discernible difference between the batches. As such, we soaked whole farro grains in our experiments.

It is surprising to see *alica* used as an ingredient in bread as one would expect only flour. Furthermore, even using emmer flour is interesting because emmer is better suited to porridge than bread making because it has a weaker gluten structure and therefore does not rise as effectively as other varieties of wheat. As a result, scholars have not attempted to precisely recreate Cato's *placenta* with *alica*, but instead substituted wheat flour. e.g., (Leon, 1943), emmer flour (Hill and Bryer, 1995), and semolina flour (Dalby and Grainger, 2012).[5]

Step Two: Forming the *Tracta*

Cato continues: "When the *alica* is well worked, add four pounds of flour (*farina*) gradually. From this make *tracta*."

This step was initially perplexing because flour and farro paste combined in the specified ratio are too dry to create a dough on their own.[6] The amount of dry flour left over when combining only these two ingredients is shown in Figure 4. However, this does not mean that the recipe cannot work. Cato's concise instruction "make *tracta*" seems to indicate an

assumed knowledge on the reader's part.[7] The late 2nd/early 3rd century AD writer Athenaeus tells us that *tracta* are made from the same ingredients as bread (Athenaeus, 1854, 113d), and bread was, and is, made from flour, water, and salt - a combination Cato specifies in #74, his simple bread recipe. We can reasonably assume that Cato expected his reader, at a time when commercial bakeries were still novel, to know to add water to dough to achieve a proper texture. Similarly, an experienced baker today would know to add water to a pie crust even when only given a ratio of flour to butter in the recipe. Therefore, we added water and salt to the flour and farro paste to form the *tracta* dough.

The next question was what kind of flour to use in the *tracta* dough, as Cato uses only the generic term *farina*. We experimented with two kinds of flour, a hard winter wheat and emmer. Both types of wheat would have been available at Rome in Cato's time (Pliny, *NH,* 18.26)[8], but emmer had great cultural and religious importance to the Romans. We found that *tracta* made with winter wheat flour were consistently crumbly and under-hydrated compared with the *tracta* made with emmer flour, even when comparatively more water was added. Given the importance of having a flexible, soft dough when shaping the *tracta*, we concluded that emmer flour was the better choice. This also makes *tracta* an entirely emmer product.

Since Cato's *placenta* recipe makes a huge *placenta* (more than 26 pounds of ingredients), we scaled down the recipe in our initial experiments. For the *tracta*, we experimented with roughly 1/12 the original amounts (See Table 1), and these ratios of farro paste, emmer flour, water, and salt created a functional dough. We then kneaded the dough until smooth, springy, and slightly tacky, which took about 20 minutes.

Emmer Flour	115 g
Farro	57.5 g (93 g after soaking)
Water	50 g
Salt	Large pinch

TABLE 1. SCALED DOWN TRACTA INGREDIENT MEASUREMENTS.

Cato continues: "Arrange the *tracta* in a wicker basket, where they will dry. When they are dry, arrange them neatly. When making each *tracta*, when you have kneaded them, touch them with an oiled cloth, wipe them all-around, and rub them." We let the dough rest for about 15 minutes to relax the gluten, before splitting the dough into four equal size pieces, and rubbing them all over with olive oil. Although Cato mentions the oil step after describing how the shaped *tracta* should be dried in a basket, he says to use the oil "when making each *tracta*, when you have kneaded them." Thus, the recipe seems to indicate wiping with oil during the shaping step, after they have been kneaded into dough but before they are left to dry.

Since later in the recipe the *tracta* are layered in a stack, the *tracta* are understood to be flat sheets. And this concept is supported linguistically, as the term *tracta* is cognate with the verb *traho*, meaning "to move by pulling"[9], indicating that the main characteristic of *tracta* was their being pulled into shape. The oil helps this shaping process, as it makes the dough more malleable so it can be stretched flat by hand like a pizza dough, and prevents the dough from tearing while being stretched.

Once shaped into rounds roughly three milimeters thick (See Figure 5), the *tracta* were set aside to dry as instructed. To study the purpose of using farro paste in *tracta*, we made comparative batches of *tracta* in which we replaced the farro paste with an equivalent amount of emmer flour and water. We then baked both types of *tracta* in a 190℃ oven[10]. Both kinds of *tracta* were fully baked after 11 minutes, but the *tracta* made with farro paste were chewier, tougher, and denser. The smashed farro thus seemed to add only qualities undesirable in a loaf of bread. However, when used in the *placenta* as intended, we will see that these same traits became beneficial.

Step 3: Assembling the Placenta

Cato continues: "When the *tracta* are made, heat up your cooking fire and your crock. Then moisten the 2lb flour (*farina siliginea*) and knead it; from this you make the thin base."

The base uses *farina siliginea*, a term understood to mean bread wheat (Moritz, 1985). This makes sense, as bread wheat has higher gluten which causes a stronger structure that rises better. We combined bread flour, water, and salt into a dough, kneaded it for roughly 20 minutes, and set it aside to rest. Note that if you reduce the filling to 1/12 of the original recipe, you must reduce the base to only 1/5 of the original recipe or you will have too small a dough due to the changing surface area to volume ratio.

Cato then instructs one to make the filling: soak 14lbs of sheep's cheese to remove the brine, squeeze the cheese dry, knead the cheese, press it through a sieve, and combine with 4.5 lbs honey. For the filling, we used feta that we dried but did not soak, as the feta we could get was not so hard brined as to need this step.[11]

Cato continues: "On a clean table, put the base, with oiled bay leaves under it, and make the *placenta*. First place a single *tracta* over the whole base, then, one by one, spread the *tracta* with the mixture from the mortar and add them, spreading them in such a way that you eventually use all the cheese and honey, and on the top put one more *tracta* by itself. Then draw up the edges of the base." We found that letting the *tracta* dry for the duration of time that it took to heat up the oven, make the dough for the base, and mix the filling made for *tracta* that were still doughy inside, but developed a thin dry skin that made them less delicate and easier to transfer onto the crust. In contrast, if let sit for hours, the *tracta* became dark brown and brittle, were harder to assemble in the next step, and offered no benefit to

the final product. To assemble the *placenta,* we stretched the dough for the base into a thin round and topped with one *tracta* in the centre. We then alternated layers of cheese mixture and *tracta*, finishing with a *tracta* on top. The base-dough is then drawn up around the *tracta* like a galette, ideally stretching to make a seal at the top. *Tracta* are thus in direct contact with the base-dough at the bottom and top of the *placenta*. Finally, oiled bay leaves are placed underneath the *placenta* before baking.

In our initial experiments with scaled-down *placentas*, we experimented with the importance of farro paste to the *tracta*.[12] We again made comparative batches of *tracta* in which we replaced the farro paste with an equivalent amount of emmer flour and water. We then assembled two *placentas,* each made with one kind of *tracta*, and baked them in Dutch ovens that had been preheated over hot coals, in an attempt to replicate as closely as possible Cato's instructions to bake them "*sub testu*", a technique in which something is cooked in a covered pot with hot coals underneath and on top (Benton, 2020).[13]

The two *placentas* clearly differed in appearance, composition, texture, and flavour. The outside of the *placenta* made with farro paste was glossy and crisp with a deep amber colour (See Figure 6), while the outside of the other *placenta* looked raw and felt soft despite being fully baked (See Figure 7). The *placenta* made with farro paste contained clearly defined layers of cheese and *tracta*, while in the other *placenta* the *tracta* had practically dissolved into the cheese mixture. When eating the *placenta* made with farro paste, the *tracta* acted as a toothsome complement to the soft cheese (See Figure 8), and everyone who tasted it agreed that this textual contrast was delicious, while the other *placenta* was unpleasant to eat because of its mushy texture.

Full-sized version

After experimenting with scaled-down versions, we made one full-size *placenta* (See Figure 9). Rather than cooked in a pot outside over an open fire, we assembled and baked this *placenta* in the controlled environment of a professional bakery.[14] While the smaller *placenta* could be assembled and cooked in a little over an hour, the full-sized version took over three hours. The greatest difficulty, however, in making the full-sized batch was that the cheese mixture became runny. This was likely a result of a change in our processing of the feta. With the scaled-down versions, the feta was broken up by hand into crumbles and then combined with the honey. However, with the full-size version, we followed Cato's instructions to "press the cheese through a sieve", which made the cheese much smoother and drew out much moisture. As a result, the cheese became so runny that only about a quarter of the mixed filling could be added to the *placenta* before the crust started to overflow (See Figure 10). Since Cato calls for cheese brined to such a degree that it needs to be steeped in water to make it palatable, he was presumably working with a significantly harder cheese than the feta we used, which likely did not become as broken down when passed through a sieve.[15] Despite this setback, our *placenta* was able to be assembled into shape.

We started baking the full-size *placenta* at 218℃, as this high temperature would quickly set the crust and start the browning process. After roughly 8 minutes of cooking, when the crust started to become dark brown in spots, we reduced the heat to 176°C for the remaining 57 minutes of baking time. The baked full-size *placenta* turned out similarly to the smaller version: the crust darkened, the layers of cheese and *tracta* stayed separate, and the *tracta* retained their chewy texture. This large *placenta* could even be cut into slices like a pie. People who tasted it found the texture pleasant to eat, and commented on the nutty flavor of the *tracta*. The bay leaves underneath the crust even perfumed the inside of the *placenta* while leaving a delightful smell in the kitchen.

Farro Paste Used Elsewhere in Cato

Cato's sections 77-82 are variants of *placenta*, with each section changing one element: *Spira* (#77) is *placenta* with the *tracta* dough "drawn out like a rope" rather than flattened into discs; *Scriblita* (#78) is *placenta* made without honey; *Erneum* (#81) is *placenta* cooked in a water bath rather than in an oven; and *Spaerita* (#82) is *placenta* made with *tracta* in balls instead of sheets. We experimented with similarly scaled-down versions of recipes #77, 78, & 81, again making one version of each dish with *tracta* made with farro paste and one with *tracta* made with only emmer flour. In each of these variants the farro paste made a distinct difference to the crust, layers, and internal texture of the final product similar to the results of the *placenta* experiment.[16]

Cato also uses farro paste in two pan-fried pastries. To make *globi* (#79), Cato instructs the reader to "mix cheese and *alica* in the same way", presumably referring to the preceding *placenta* and variants recipes. This mixture is then to be formed into balls and fried in oil. *Encytum* (#80) differs from *globi* only in shape, with the mixture extruded into the hot oil, perhaps like a funnel cake. We combined feta and farro paste in the ratio of the *placenta* recipe (7:1), formed them into shape, and fried them in oil. Both pastries lost their shape and stuck to the bottom of the pan. However, when we fried a comparative batch made without farro paste and only emmer flour, it held together much better and did not stick, although the final product was quite dense. We found that using a mixture of half farro paste and half emmer flour made the batter hold its shape without being too dense (See Figure 11). Perhaps Cato intended the reader to combine "cheese and *alica* in the same way" as the ratio of flour to *alica* in the *placenta* recipe (2:1) and this reduced amount of cheese and moisture might make for more stability. Or, perhaps Cato's use of a harder brined cheese would have made for less moisture and allowed the 7:1 ratio to work.

The Science of *Alica*

The inclusion of the farro paste changes the dough in one fundamental way: it significantly increases the hydration of the dough. When using farro paste, the dough had a total hydration (expressed as a ratio of water to flour content) of 75%, absorbing 35.5g of water in

the paste itself and 50g of water added before kneading the final dough. When making a dough with only emmer flour, the dough was only able to absorb 55g of water, amounting to 48% dough hydration.

The reason behind this significant difference in dough hydration is due to a combination of factors. The farro paste is made from pre-soaked grains, which hold water themselves and thus add moisture to the dough without stressing the flour beyond its absorption capacity. Breads made with a 'soaker' have "high moisture retention, which prolongs keeping quality."[17]

The other factor that alters the dough's hydration is the damaged starches which the farro paste add to the dough. Starch is a critical component of dough, and it is the heated, gelatinized starches that ultimately form the structure of the final baked bread. Starch is present in all wheat flours, primarily in the form of native starches which are intact and absorb water at their periphery. Some of the native starches present in the grain are inevitably damaged in the process of harvesting and milling the grain; this is significant because damaged starches absorb up to six times as much water as native starch particles. The addition of the farro paste likely increases the proportion of damaged starches in the dough significantly, as the starches are released (and damaged) in the process of mashing the soaked grain into a paste. By mixing those damaged starches into the dough, it will increase the dough's water absorption capacity.[18]

The added benefit of the extra starch in the *tracta* made with farro paste for Cato's recipe is that it interacts with the cheese mixture in the placenta, serving as a thickening agent, much as adding starch to a pie filling. To visualize the increased starch levels we cooked *tracta* made with and without farro paste in water. Both types were cooked in a cast iron skillet that was filled with three cups of water and brought to a slow simmer. They were removed from the water after seven minutes. The batch made with only flour and water had a similar texture to pasta. It was flexible and easy to tear in half. The *tracta* made with farro paste retained its bready texture and broke in three places when we tried to remove it from the pan. After boiling the *tracta*, both simmering waters were clouded by starches, but the batch made with farro paste appeared to have released significantly more starch (See Figure 12). The impact of the extra starch can clearly be seen in the radical difference in the final texture of the two scaled-down placentas (see p.8).

Conclusion

We attempted to better understand Cato's *placenta* recipe through experimentation with both full-size and scaled down versions of the dish. A particular focus was on the purpose of the farro paste, because this is an ingredient we had never seen in a baked good. We discovered that this ingredient was crucial for the texture and composition of the dish. As just after this recipe was written leavened breads became the norm at Rome, and this technique

disappeared from our sources, this recipe can be viewed as a last gasp of an archaic Roman baking technique.

1 All translations from Dalby, 1998, modified.

2 1 Roman pound = .721 English pound = 327.45 grams. (Oxford Classical Dictionary *s.v.* weights).

3 We used three brands of pearled farro: Campanini, Bob's Red Mill and Italian Harvest; there was no noticable difference in the end product.

4 See discussion of *mortarium* as mixing bowl or mortar in Moritz (1958) and Dalby and Grainger (2012).

5 Moritz (1958), Solomon (1978), and Perry (1982) understand that *alica* were emmer groats, but do not discuss cooking with them.

6 The soaked emmer groats did not absorb enough water to later hydrate the flour enough to form a dough.

7 Leon (1943, p.217) found the lack of instructions in this recipe to indicate that "the process must have been familiar to anyone experienced enough to attempt to construct the pastry."

8 See Braun 1995 for further discussion of emmer wheat use in ancient Rome.

9 Oxford Latin Dictionary, *s.v* traho

10 Roman ovens would have likely reached similar temperatures of 190-200℃ (Dalby and Grainger, 2012).

11 For discussion of brined cheeses including feta, see Asher, 2015, 177-184

12 We thank the students in Morton's spring 2023 *Experimental Archaeology and Experiential History* course at Carleton College for their help with these experiments.

13 We tried two cooking techniques with similar results: cooking with the pots both on and covered by hot coals for roughly 15 minutes before being removed from the coals to continue cooking with residual heat for another 15 minutes, and using less coals and keeping the pots on the heat for the full 30 minutes.

14 We thank Bread People Bakery in Northfield, MN.

15 We made ten layers of *tracta* and nine layers of cheese as opposed to the four layers of *tracta* with three layers of cheese in the 1/12 size *placenta*.

16 Compared to Cato's *libum* (#75) in which the cheese mixture is mixed into the dough, each of these layered breads took significantly less time to bake and had a less dense final texture

17 Hamelman, 2012, p.45 for further information on the properties of soakers.

18 See Suas, 2008, p.145 and Hamelman, 2012, p.35 for further discussion of starch damage and its impact on bread dough.

Keywords bread
(re)construction

Country USA

Appendix 1

Placenta Recipe

For a 15 cm *placenta*	For a 36 cm (full-sized) *placenta*
57.5 g farro, soaked in water overnight	655 g farro, soaked in water overnight

115 g emmer flour	1,310 g emmer flour
130 g bread flour	655 g bread flour
0.45 kg (1 lb) feta cheese	4.5 kg (10 lb) feta cheese
145 g honey	1,474 g honey
Water: 50 g for *tracta*, 95 g for crust	Water: 544 g for *tracta*, 400 g for crust
Salt: a large pinch for the *tracta* and crust	Salt: 14 large pinches for the *tracta*, 5 large pinches for the crust
Olive oil	Olive oil
Bay leaves	Bay leaves

1. Drain the soaked farro. Pound it in a mortar and pestle until it forms a sticky white paste, about five minutes. You can squeeze the farro by hand for a longer time if you do not have a mortar and pestle.
2. Measure the emmer flour and salt into a bowl. Add in the farro paste and *tracta* water Begin with less water than the recipe calls for to ensure you do not over-hydrate the dough (it will become stickier than it initially seems after you knead it).
3. Knead the dough until it is soft and tacky but not sticky, about twenty minutes. Add more water as you knead, if necessary.
4. Set the dough aside for about 15 minutes to let the gluten relax before stretching.
5. Divide the dough into equal sized pieces (four for the 15 cm, ten for the 36 cm *placenta*).
6. Wipe one ball of dough with a cloth dipped in olive oil. Stretch the dough into rounds with your hands by lifting it and pulling the edges like a pizza until they are thin but not tearing. Set aside on a clean kitchen towel. Repeat with the remaining dough pieces.
7. Preheat the oven to 218℃ on the convection setting (raise the heat to 230℃ if not using a convection oven).
8. In a clean bowl, combine the bread flour, water (see *tracta* water note) and salt. Knead until the dough is soft and stretchy but not sticky. Set aside.
9. Dry the feta cheese if packaged in brine. Crumble it into a bowl and mash it with your hands to break down any large pieces.
10. Add the honey to the feta and stir to combine. Set aside.
11. Line a baking sheet with parchment paper. Gently toss bay leaves in oil and use the leaves to roughly cover the centre of the baking sheet.
12. Stretch (or roll) the crust dough until it forms a thin round that can comfortably fit the *tracta* with extra dough that will be used to wrap over the *tracta*/cheese layers. Place on

top of the bay leaves on the baking sheet.

13. Put one tracta over the crust, spread a portion of the cheese mixture onto it, and repeat until all ingredients are used. End by placing the last *tracta* over the final layer of cheese.
14. Draw the edges of the crust around top of the last *tracta*. The crust can be pleated to overlap like a galette.
15. Bake the *placenta* for 8 minutes, or until the crust starts to brown. Turn the heat down to 176°C (160°C if not using a convection oven) and bake until the crust is golden brown and a skewer inserted into the centre of the *placenta* is met with some resistance (about 25 minutes more for the 15 cm, 60 minutes for the 36 cm *placenta*). Alternatively, bake until an instant-read thermometer registers at least 80°C.
16. Remove from the oven and, optionally, use a pastry brush to coat it with honey.

Allow the *placenta* to partially cool on the baking sheet before slicing into it and serving.

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FIG 1. FARRO THAT WAS EASILY FLATTENED WITH LIGHT PRESSURE AFTER NINE HOURS OF SOAKING. PHOTO BY ELLEN SCHLICK

FIG 2. FARRO PASTE CREATED BY HAND. PHOTO BY ELLEN SCHLICK

FIG 3. FARRO PASTE CREATED WITH A MORTAR AND PESTLE. PHOTO BY ELLEN SCHLICK

FIG 4. TRACTA DOUGH WITHOUT ADDED WATER. PHOTO BY ELLEN SCHLICK

FIG 5. SHAPING TRACTA. PHOTO BY ELLEN SCHLICK

FIG 6. PLACENTA MADE WITH ALICA. PHOTO BY ELLEN SCHLICK

FIG 7. PLACENTA WITHOUT ALICA. PHOTO BY ELLEN SCHLICK

FIG 8. TRACTA MADE WITH ALICA HOLDS THE WEIGHT OF THE CHEESE AFTER BAKING. PHOTO BY ELLEN SCHLICK

FIG 9. FULL-SIZED PLACENTA. PHOTO BY ELLEN SCHLICK

FIG 10. OVERLY WET CHEESE MIXTURE IN THE FULL-SIZED PLACENTA. PHOTO BY ELLEN SCHLICK

FIG 11. GLOBI MADE WITH EMMER FLOUR AND ALICA. PHOTO BY ELLEN SCHLICK

FIG 12. TRACTA WITH ALICA (RIGHT) RELEASED MORE STARCH WHEN BOILING THAN TRACTA WITHOUT ALICA (LEFT). PHOTO BY ELLEN SCHLICK