

## Original Paper

## Milk Culture in Slovenia in the Western Part of the Balkan Peninsula

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## Abstract

The purpose of this paper is to identify the characteristics of the milk culture in the western part of the Balkan Peninsula by clarifying the milk processing system in Slovenia, and comparing and analyzing the milk culture in Slovenia against the milk cultures in Europe and West Asia. The characteristics of the milk processing systems in Slovenia can be summarized as follows: 1) unpasteurized raw milk is left out to make naturally fermented milk, 2) cream is separated from raw milk first, 3) cream is churned into butter, and butter is heated to make butter oil in some regions, 4) un-matured cheeses are made by heating, draining, and drying naturally fermented milk, and 5) matured cheeses are made using rennet in the Alps. The milk processing system in the western part of the Balkan Peninsula shows that the milk processing technique transformed from the fermentation processes to the cream separation processes as milk processing technique spread from West Asia to the cool climate of Europe. In terms of cheesemaking, the western part of the Balkan Peninsula can be said to be the exact region where the European and West Asian cultures blended, because un-matured cheeses by draining and drying fermented milk which developed in West Asia and matured cheese with rennet developed in European Alps were both processed here. The western part of the Balkan Peninsula appears to be the intersection where the fermentation processes from West Asia crossed with the cheesemaking processes developed in Europe.

**Key Words:** naturally fermented milk (自然発酵乳), cream separation (クリーム分離), matured cheese (熟成チーズ), milk processing developmental history (乳加工技術発達史)

## Introduction

West Asia is the origin of milking and milk processing<sup>1~3</sup>. The milk culture (milking and milk processing) in West Asia is characterized by turning of raw milk into sour milk and then draining and drying the sour milk to make un-matured cheeses that can be stored for a long time<sup>4~6</sup>. By making longer-preserving un-matured cheeses from sour milk, people were able to have a reliable supply of milk products during the non-milking season, which helped them to build the subsistence of

pastoralism. Meanwhile, Europe's biggest contribution in the history of milk culture was the cheese maturation using rennet. The development and processing of long-preserved matured cheeses using rennet improved the flavor of the cheeses and developed the subsistence of transhumance, a seasonal vertical pastoralism, in places like the Alps<sup>7,8</sup>. The author conducted researches on the Balkan Peninsula, which is at the midpoint of Europe and West Asia, to discuss how the milk culture developed in Europe<sup>9~11</sup>.

The milk culture in Bulgaria in the eastern part of the Balkan Peninsula is characterized by their positive processing of sour milk and processing of brined matured cheeses using rennet<sup>9,10</sup>. In Romania, located in the same eastern part of the Balkan Peninsula, they intentionally process sour milk, and at the same time, use naturally fermented milk to make both matured hard cheeses and

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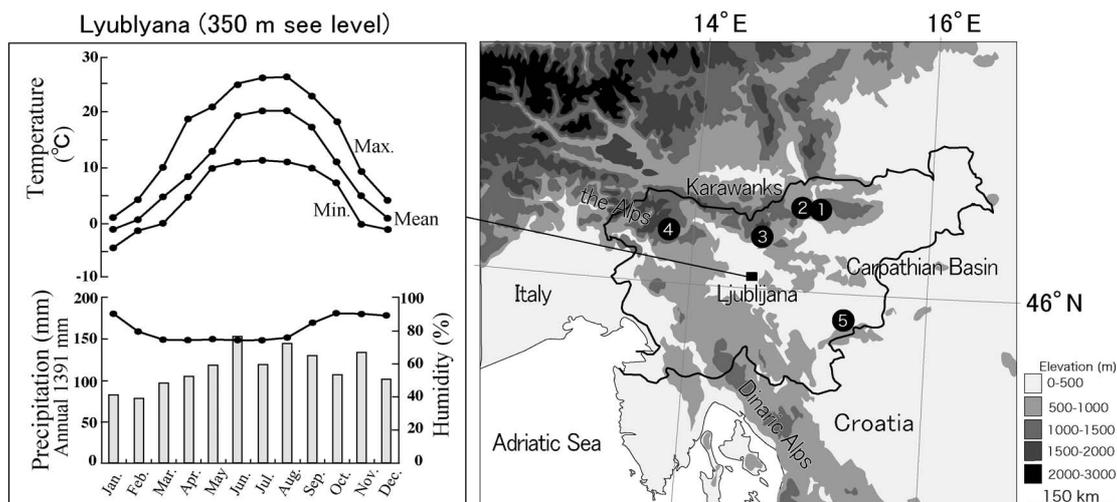


Fig. 1 Study sites (1–5) in Slovenia, and weather conditions in Ljubljana.

brined matured cheeses using rennet<sup>12</sup>). On one hand, the milk culture in the eastern part of the Balkan Peninsula is thought to represent the early form of matured cheeses made with rennet, providing with valuable information for reconstructing the developmental history of matured cheeses in Europe. On the other hand, there have not been enough reports from the western part of the Balkan Peninsula, which is a region adjacent to Italy, Austria, and other western European countries where matured cheeses developed. The milk culture in the western part of the Balkan Peninsula, like the case from the eastern part of the Balkan Peninsula, is thought to provide useful information to the discussion of the developmental history of milk culture in Europe. The purpose of this paper is to identify the characteristics of the milk culture in the western part of the Balkan Peninsula by 1) clarifying the milk processing system in Slovenia, and 2) comparing and analyzing the milk culture in Slovenia against the milk cultures in Europe and West Asia.

## Materials and Methods

### 1. Ecology of research site

The eastern edge of the Alps is at the north-western part of Slovenia, the Karawanks is found in the northern region, and the Dinaric Alps extends from southern Slovenia to western Croatia (Fig. 1). The Carpathian Basin is located inland in

Slovenia, and the Adriatic lowland is found along the coast<sup>13</sup>. The climate zone is quite diverse in parallel with the terrain, with a cold climate in the mountains, a continental climate in the inland region, and a Mediterranean climate along the coast.

It is relatively cold in Ljubljana, the capital city of Slovenia, with an average monthly temperature of about 20°C even in the summer<sup>14,15</sup>. It becomes colder as the altitude rises in the Alps and other mountain regions, and it becomes much warmer on the coast of the Adriatic Sea. Ljubljana is humid and receives rain throughout the year with an annual rainfall of 1,391 mm. The ecological environment in Slovenia can be described as cold and humid in the mountains, warm and humid in the inland, and hot and semi-dry on the coast.

### 2. Research method and research households

The field survey was conducted in September, 2017 on a total of five households. The research households were selected at random from all over Slovenia. The interviews were conducted in Slovenian and notated in English alphabet.

The research households 1, 2, and 3 are located in the Karawanks mountains in northern Slovenia, household 4 is located at the eastern edge of the Alps in northwestern Slovenia, and household 5 is located in the Carpathian Basin in the inland of Slovenia. Household 1 was a farmer who used to raise cows and grow crops as they permanently

settled in the lowland between the mountains. They currently stop raising any livestock. Their previous milk processing technique was interviewed at household 1. Household 2 permanently settled in the hill region of the Dinaric Alps, raising 24 cattle and selling raw milk and milk products from their ranch. Household 3 is a transhumant household who engages in seasonal, vertical transhumance in the Karawanks mountains. They raise six cattle, process raw milk, and sell milk products. They also own a restaurant for the tourists in the summer at their summer ranch. Household 4 is a transhumant household who engages in seasonal vertical transhumance in the Alps. Their livelihood is built on raising 14 cattle, processing raw milk, and selling milk products. Household 5 is permanently settled in the Carpathian Basin and manages a ranch with 50 cattle. Their livelihood is built on shipping raw milk and processing milk products for personal consumption. The observation and interviews were conducted about the milk processing process to the women at households 2, 3, and 5, and to the man at household 4, who are in charge of the milk processing.

Croatia is located south of Slovenia. While traveling through Slovenia, the author met a household who was originally from Croatia. A supplemental research and interviews were conducted in the household on the case in Croatia to analyze the characteristics of the Slovenian milk processing techniques.

## Results

Household 1 (Case 1 in Fig. 2) uses the milk processing technique of the cream separation processes (Fig. 2). After milking, the fresh raw milk is filtered with a cloth or a sieve to remove contaminated particles. Raw milk is called *mleko* in Slovenian. After removing contaminated particles, the raw milk is poured into a shallow dish called *latvicha* (Fig. 3) without pasteurization and left out in a warm place, which was always in a cabinet near the kitchen. The cabinet is thought to be inhabited with locally native flora, which helps with fermentation. Once the raw milk is left standing overnight, cream called *smetana* floats to the surface and naturally fermented milk called

*kislo mleko*<sup>a)</sup> is formed under the cream. The naturally fermented milk has curdled into a gel primarily from the fermentation by the lactic acid bacteria<sup>16,17)</sup>. *Smetana* and *kislo mleko* are eaten plain or with bread.

The cream, *smetana* is churned for about 30 min with a plunger in a wooden churn called *pinya* (Fig. 4) to make butter called *maslo*. *Maslo* is washed and shaped in a mold. It is eaten or sold within a few days, because the flavor declines if it is left for too long. In order to preserve *maslo* longer, it is heated and processed into butter oil. Butter oil is called *kuhano maslo*<sup>b)</sup>. *Kuhano maslo* can be kept for several months at room temperature. Buttermilk produced through butter processing is called *sirootka*. It is also called *pinyenech* at households 2, 3, and 5. Buttermilk is fed to the pigs and is never processed further into other milk products.

The naturally fermented milk, *kislo mleko* is warmed at temperature of 40 to 45°C for about 3 to 4 h to make curds called *sirna zarna*<sup>c)</sup>. They say that it is important to heat the milk under relatively low temperature for a long time, because the curds can become too hard if the heating temperature is too high. The curds formed are placed in a sieve and left out for about 1 h to drain moisture. The cheeses made from this process are called *skuta* and the whey is called *sirootka* (Fig. 5). *Skuta* is mainly eaten with bread. Just the right amount of acidity and sharpness as well as the soft texture of the cheese pair very well with bread. The whey, *sirootka* is used in dough to make bread or drunk for health reasons.

Household 2 also makes long-preserved cheeses out of naturally fermented milk, *kislo mleko*. There are two ways of making cheeses with *kislo mleko*. In the first method, *kislo mleko* is cut thinly and whey, *sirootka* is poured out. The curds formed here is called *sirna zarna*. *Sirna zarna* is placed in a sieve to drain some more and the resulting cheeses are called *skuta*. *Skuta* does not keep for a long time, so it is eaten within a few days. The second method of processing *kislo mleko* is to drain it to make curds called *sirna zarna*, which is poured into a mold, pressed, and left to drain for about half a day. Then the cheese is taken out of the mold and brined for about 20 min. The cheese made here is called *mladi sir*<sup>d)</sup>. *Mladi sir* can immediately be eaten plain to

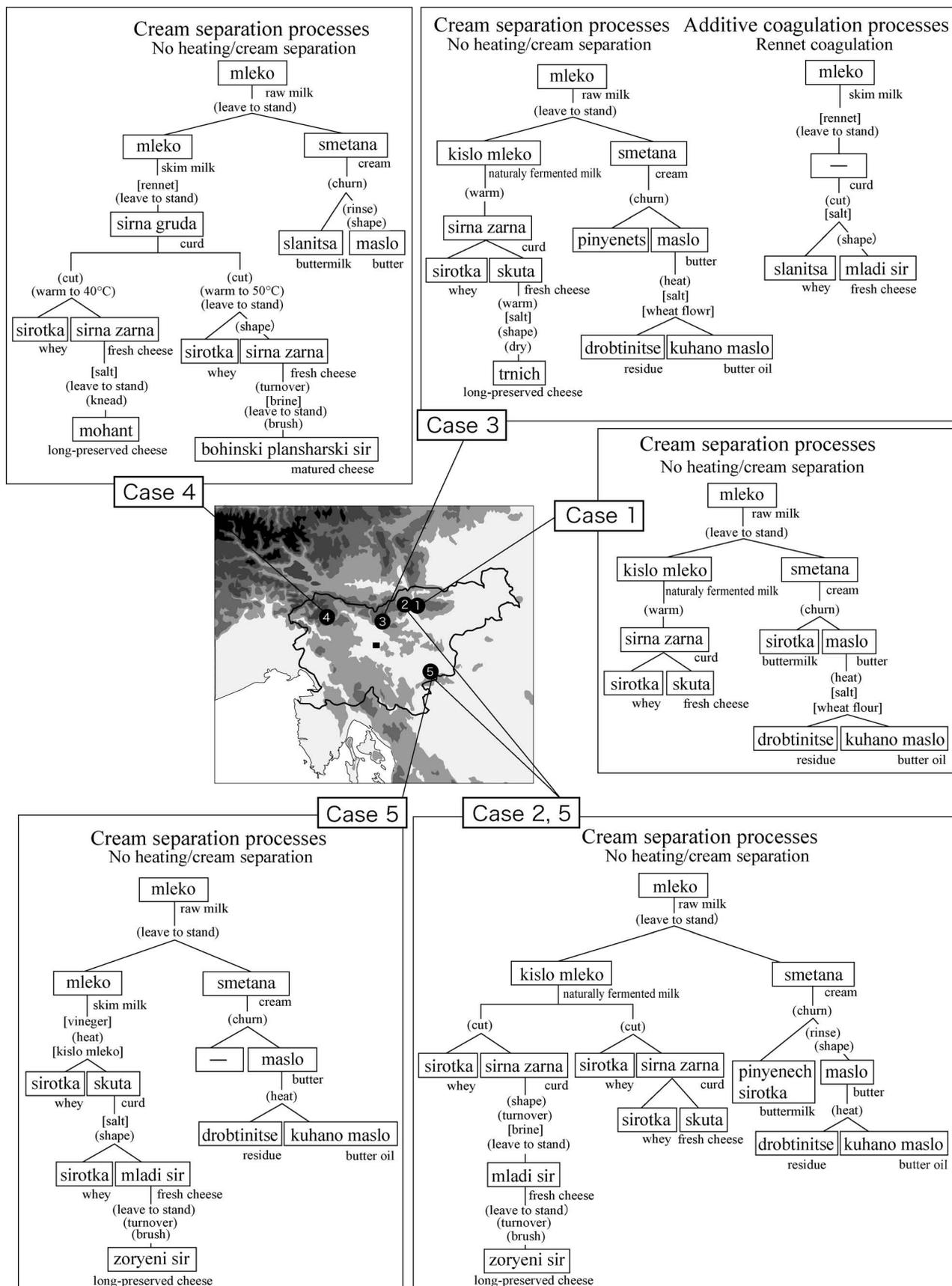


Fig. 2 Milk processing system in Slovenia.  
 □ Product ( ) Additives [ ] Treatment  
 — : Processing carried out but product name uncertain



Fig. 3 Milk bowl with shallow bottom called *latvicha*.

enjoy the freshly made cheese. It is also stored in a cool place for about six months to dry to make long-preserved cheese. It is turned over repeatedly during this time and it is washed if it becomes moldy. The resulting long-preserved cheese is called *zoryeni sir*<sup>e)</sup>. *Zoryeni sir* is more like a cheese that has been dried to keep longer rather than a matured cheese. It is eaten plain, grated on pasta or pizza, or made into sauce.

Household 3 utilizes the same milk processing technique as household 1, but they also make long-preserved cheeses from curds, *skuta* as well as utilize the additive coagulation processes, which uses rennet as a coagulant to make cheeses. To make long-preserved cheeses, *skuta* is heated to 40 to 42°C, and then drained in a cloth. The drained curds are heated to 45°C and crumbled by hand. It is salted and formed into a log of about 6 cm long and 5 cm in diameter. The curds are marked on the surface with an impression with a wooden stick that has each household's design. These curds are



Fig. 5 Curd called *sirna zarna* (right) and cheese called *skuta* (left).



Fig. 6 Long-preserved cheese '*trnich*' processed from naturally fermented milk.

left for about two to three weeks to dry out and turn into long-preserved cheeses. Some households cure the cheeses with smoke during this drying process. The resulting cheese is called *trnich* (Fig. 6). *Trnich* is also not a matured cheese, but a



Fig. 4 Churn called *pinya*: wooden cylinder (left) and plunger (right).

cheese made of curds that had been dried to have a longer shelf life. Cheesemaking with rennet involves adding rennet called *sirishche* to raw milk while the milk is still warm. It is left for 1 h to form curds. Rennet is purchased at a pharmacy. The name of the curds made from this process is unknown. The curds are cut, salted, and then stirred for about 15 min. The curds are poured into a mold to be shaped and to drain whey, *slanitsa* from the curds. The resulting fresh cheese is called *mladi sir*. *Mladi sir* is not processed into long-preserved cheese, but all of them are sold as fresh cheese to the tourists.

Household 4 uses rennet to make long-preserved matured cheeses. Raw milk is left in a cool place to separate the cream, *smetana* which floats to the surface. Then, the leftover skim milk, *mleko* is heated to 32°C. Rennet, *sirishche* is added to the warmed *mleko* and left at room temperature to curdle for about 30 min. The resulting curds are called *sirna gruda*<sup>5)</sup>. The curds, *sirna gruda* are cut and then heated to about 50°C while stirring constantly for about 40 min to drain the curds. When the temperature has reached 50°C, they are taken off the heat, and the curds are left soaking in whey for about 30 min. It is believed that by soaking the curds in whey, more whey is extracted from the curds and the curds become firm and elastic. The curds are poured into a mold to shape fresh cheese called *sirna zarna*. *Sirna zarna* is turned every hour for about 10 h. After the cheese is turned, it is placed in a brine and soaked for about 3 d. It is taken out of the brine and placed on a wooden shelf and left to dry for about 3 months. If mold grows on it, it is removed with a brush. The cheese will not crack or have any problems even when it is left at room temperature, because it is cool and humid on the Alps mountainside. This matured cheese is called *bohinjski plansharski sir*<sup>6)</sup>. Each one weighs about 4 kg and is about 7 cm tall with a diameter of about 30 cm. These days, the pastoralists have been making small *bohinjski plansharski sir* to sell to the tourists. *Bohinjski plansharski sir* can be described as a matured cheese similar to the hard cheeses widely popular in the European Alps region. At household 4, butter is the final form of milk fat processing and butter is not processed into butter oil. Only processing as far as butter and



Fig. 7 Long-preserved cheese 'mohant' by rennet using.

storing milk fat in a form of butter are also consistent with the milk processing technique widely found in the Alps.

Household 4 uses another process to make a milk product from the curds, *sirna gruda*. Once *sirna gruda* is cut, it is heated at 40°C to drain the curds. The curds are not stirred much when they are being heated. Once the temperature reaches 40°C, the whey is removed to separate the curds. The resulting fresh cheese is called *sirna zarna*. This fresh cheese, *sirna zarna* is placed in a container, mixed with salt, covered, and left for about two months. During this time, it is mixed every other week. The resulting long-preserved cheese is called *mohant* (Fig. 7). *Mohant* is so dry that it cannot be shaped, but it has a slight moisture. It is very salty and sour. It becomes sourer with time, but it does not taste spoiled. Its flavor is smooth and the two months' period appears to have extended some maturation. However, *mohant* is more like a cheese that can be preserved longer through draining and salting, rather than a matured cheese.

Household 5 utilizes the milk processing technique using vinegar as a coagulant in addition to the cream separation processes that are used by household 2. Raw milk is poured into a shallow dish called *latvicha* and is left in a cool place. Next morning, *latvicha* containing raw milk and *smetana* that has floated to the top, is placed in an oven and heated until the surface is browned. They claim that they can separate more cream when the milk

is heated. After it is heated in the oven, *latvicha* is tilted to pour out the skim milk sitting at the bottom. The browned *smetana* is left inside *latvicha*. *Smetana* is processed into butter called *maslo* and butter oil called *kuhano maslo* in the method similar to the one described above.

Skim milk is also called *mleko* at household 5. Apple cider vinegar is added to *mleko* while it is still warm, and heated to boiling to curdle the skim milk. The curds are called *skuta*. Sour milk, *kislo mleko* is sometimes added when making *skuta*. They claim that *skuta* is much softer when they add *kislo mleko*. It is eaten plain or used in a pasta dish called *sirovi shtrukli*<sup>b)</sup>. *Skuta* is also further processed into cheese when it is salted and placed in a mold. A rock is placed on top and left overnight to drain. The resulting fresh cheese is called *mladi sir*. It can be eaten plain and is never used in cooking. The fresh cheese, *mladi sir* is left in a dark, cool place for about two months to dry. If mold grows on the surface during this time, it is brushed off and then turned over. The resulting long-preserved cheese after two months of drying is called *zoryeni sir*. Like the cheeses made from draining and drying naturally fermented milk, *zoryeni sir* is a cheese that has been dried to keep longer, rather than a matured cheese.

In summary, it was understood that the milk processing system in Slovenia in the western part of the Balkan Peninsula uses the milk processing techniques of cream separation processes and additive coagulation processes. The characteristics of the milk processing systems can be summarized as follows: 1) unpasteurized raw milk is left out to make naturally fermented milk, 2) cream is separated from raw milk first, 3) cream is churned into butter, and butter is heated to make butter oil in some regions, 4) unmatured cheeses are made by heating, draining, and drying naturally fermented milk, and 5) matured cheeses are made using rennet in the Alps.

## Discussion

### 1. Characteristics of Milk Culture in the Western Part of the Balkan Peninsula

The Slovenian milk processing system is characterized by leaving unpasteurized raw milk in a

warm place to separate cream as well as naturally fermented milk, *kislo mleko*. In Bulgaria, located in the southeastern part of the Balkan Peninsula, they deliberately make sour milk called *kislo mliako* through lactic acid fermentation using pasteurized milk<sup>9,10)</sup>. In Romania, located in the northeastern part of the Balkan Peninsula, they are known to process naturally fermented milk called *lapte acru*, which is also used as food<sup>12)</sup>. The method of making fermented milk in the western and southeastern parts of the Balkan Peninsula largely differs by whether they use naturally mixing bacterial flora or they intentionally add lactic acid bacteria. From the perspective of incorporating fermented milk in meals, it is common for people from the eastern and western parts of the Balkan Peninsula to consume fermented milk frequently and to use fermented milk positively in the milk processing.

Next, it is characteristic in Slovenia to make cheeses called *skuta* by heating naturally fermented milk, *kislo mleko* for a long time and draining it. In the Balkan mountain region of Bulgaria, they make similar cheeses called *kurtmach* in Bulgarian and *katâk* in Karakachan<sup>10)</sup>. These are cheeses made from raw, unpasteurized sheep and goat milk that had been left out for about 8 h. It is naturally fermented and double boiled for more than 2 h to make a thick gel. In Central Asia, there is a milk processing technique for dried cheeses called *irimshik*, which are made by heating, draining, and sun-drying naturally fermented milk<sup>18)</sup>. However, it is not the cheesemaking process used in Slovenia like *skuta* with a high moisture content. Naturally fermented milk is not made in West Asia<sup>4~6)</sup>. Therefore, it is inferred that the processing of cheeses like *skuta* with a high moisture content made from naturally fermented milk is only found on the Balkan Peninsula, and that it is a milk processing technique that most likely developed extensively throughout the Balkan Peninsula.

In the Karawanks mountains in northern Slovenia, as observed at households 2 and 3, long-preserved unmatured cheeses called *zoryeni sir* are made by draining and drying naturally fermented milk. In particular, a cheese called *trnich*, made by the transhumant pastoralists from household 3, is said to be made only in the Velika planina area in

the Karawanks mountains in northern Slovenia. These cases could mean that it was difficult to mature cheeses that were made from draining and drying fermented milk without the use of rennet. The case from the western part of the Balkan Peninsula, indicating that the cheeses made from fermented milk were not able to develop into matured hard cheeses, provides valuable information to the understanding of how the mature cheese processing developed. This draining and drying of fermented milk is also similar to the milk processing technique in West Asia<sup>4~6</sup>). This is useful information to show the path of the milk culture traveling from West Asia to the Balkan Peninsula.

The transhumant household 4 from the Alps made long-preserved matured cheeses with rennet. Their cheesemaking technique involved heating curds to about 50°C to drain whey, which is similar to the cheesemaking technique used by the seasonal, vertically transhumant pastoralists from the northern Italian Alps<sup>8,19</sup>). Even in the Slovenian Alps, they share the same rennet-using cheesemaking technique found widely throughout the Alps. By contrast, there was no processing of long-preserved matured cheeses made with rennet in the Karawanks mountains adjacent to the eastern Alps. Household 3 made fresh cheeses with rennet, but they sold all of them to the tourists as fresh cheeses without processing them into long-preserved cheeses. The seasonally transhumant pastoralists from the Alps built their subsistence on processing long-preserved cheeses in the summer and eating them in the winter<sup>20~22</sup>). The fact that the preservation of cheeses with rennet did not develop meant that cheesemaking with rennet was not the main cheesemaking technique in the subsistence of the transhumant pastoralists. Since the process stopped short of making long-preserved cheeses, household 3 most likely started incorporating the rennet technique for the tourists relatively recently. The main method of milk processing for household 3 from the Karawank mountains was to make long-preserved cheeses through draining and drying naturally fermented milk. From the information above, it can be surmised that the technique of making long-preserved matured cheeses with rennet in the western part of the Balkan Peninsula is the milk processing technique that

was originally developed in the Alps.

Household 4 does not process fermented milk, but only makes matured cheeses with rennet. The households making matured hard cheeses called “mountain cheese” in the northern Italian Alps also make only cheeses by adding rennet and do not process fermented milk<sup>8</sup>). There is an interesting phenomenon that households to process matured cheeses with rennet commonly seem to specialize only in cheesemaking. It can be said that the northern Slovenian Alps region belongs to the same milk cultural sphere as the Italian Alps, considering that they specialize in making matured cheeses with rennet.

Household 4 made long-preserved cheeses with rennet called *mohant*, which are not sufficiently matured. *Mohant* is said to be made only in the Bohinj region in eastern Alps. There is high possibility that *mohant* is representative of the primitive milk processing technique used before long-preserved matured cheeses were made with rennet. It is a very meaningful milk processing technique for recreating how matured cheeses developed in Europe.

Household 5 from inland Slovenia added apple cider vinegar and other organic acids to make cheeses. The process of adding organic acid to make cheeses is almost exactly the same as adding rennet to make cheeses. According to household 5, the milk processing technique using vinegar was transmitted after World War II. Based on their claim, it means that cheesemaking with organic acid was introduced to the western part of the Balkan Peninsula in the recent years. The fact that cheesemaking with organic acid is almost exactly the same as cheesemaking with rennet shows that cheesemaking with rennet already existed when use of vinegar as a coagulant was newly introduced. This must be why the cheesemaking method with organic acid has nearly the same processes as the cheesemaking method with rennet. The use of vinegar as coagulant was a technique also introduced in the recent years in Bulgaria in the eastern part of the Balkan Peninsula<sup>9</sup>). The cheesemaking method using organic acids as coagulant is a new milk processing technique transmitted recently to the Balkan Peninsula.

## 2. The transition from the fermentation processes to the cream separation processes

As a result of studying the milk processing system in Slovenia, the milk processing technique of the cream separation processes was the core of the milk processing system. The technique in the western part of the Balkan Peninsula is characterized by their initial separating of cream from raw milk. After the cream is separated, the cream is churned into butter or butter oil, and skim milk is processed into fermented milk or cheese. In Bulgaria, located in the eastern part of the Balkan Peninsula, the fermentation processes are the central milk processing technique in the milk processing system<sup>9,10,11</sup>). The technique is characterized by making sour milk first by pasteurizing raw milk and adding sour milk to promote lactic acid fermentation deliberately. The sour milk is churned to make butter or butter oil, and buttermilk is heated and drained to make cheese. The difference between eastern and western parts of the Balkan Peninsula is whether or not they separate cream first. The process of churning sour milk or cream into butter and processing raw milk or skim milk into fermented milk or cheese is the same in both eastern and western parts of the Balkan Peninsula. Thus, it is understood that the milk processing system in the eastern part of the Balkan Peninsula had undergone transformation from the fermented processes to the cream separation processes. The fermentation processes were first introduced to the entire Balkan Peninsula, but it appears as though it developed into the cream separation processes in the western part of the Balkan Peninsula.

The characteristic of the milk processing technique in West Asia is that they first pasteurize raw milk and add fermentation starter to make sour milk. Fermentation processes have become the central milk processing technique in the milk processing system<sup>4~6</sup>). In Europe, they centrally utilize both milk processing techniques of the cream separation processes, in which cream is first separated from raw milk, and the additive coagulation processes, in which rennet is added to raw milk or skim milk to make cheeses. Milking and the milk processing techniques originated in West Asia and the milk processing techniques transmitted to Europe. It is understood that as the milk cul-

ture transmitted from West Asia to the cool climate of Europe and the Balkan Peninsula, the milk processing technique transformed from the fermentation processes to the cream separation processes.

The authors have identified that the milk processing techniques were most influenced by the ecology of the local region<sup>23</sup>). In the hot environment of West Asia, unsterilized raw milk would immediately turn sour if it was left out. Therefore, the technique in West Asia has developed to immediately pasteurize raw milk before fermentation starter is added to deliberately form the desired sour milk. By contrast, raw milk did not immediately turn sour if it was left out in the cold environment of Europe, and because the cream with a higher milk fat content was more efficient in making butter than the sour milk made of whole milk, their technique inevitably developed into one in which they separated cream by letting raw milk sit out. Once they started using rennet to make cheeses in Europe, they also started separating cream from raw milk to mature cheeses. The Balkan Peninsula is a region that illustrates the transitioning stages from the fermentation processes of West Asia to the cream separation processes of Europe.

## 3. The crossroads of milk cultures

People left out raw milk to separate cream and make naturally fermented milk in Slovenia. This technique of making naturally fermented milk by leaving out raw milk has developed in the northern region of the Eurasian continent<sup>18</sup>). According to the Croatian pastoralist whom the authors came across during the Slovenian research, they added lactic acid fermentation starter to both pasteurized and unpasteurized milk to make sour milk in Croatia. The technique of adding lactic acid fermentation starter to make the desired sour milk has been developed in West Asia. Thus, the milk culture in the western part of the Balkan Peninsula is made up of the unique fermentation processes mixed with the milk processing techniques of northern Eurasian continent and West Asia (Fig. 8).

In the northwestern Slovenian Alps, they made matured cheeses with rennet. These matured cheeses are thought to be influenced by the milk

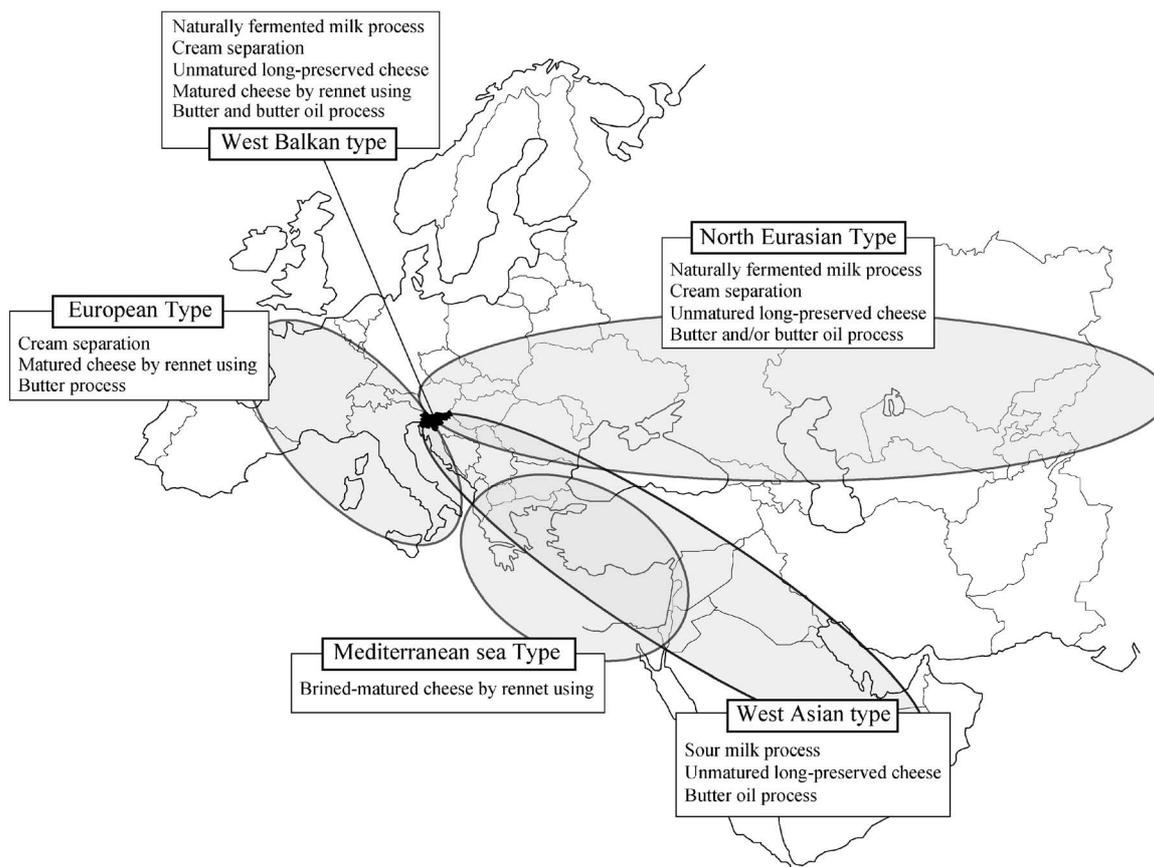


Fig. 8 Characteristics of milk culture in West Balkan type comparing with West Asian type, Mediterranean sea type, North Eurasian type and European type.

culture from the European Alps. In regions outside of the Slovenian Alps, they made unmatured cheeses by draining and drying fermented milk. The dried unmatured cheeses made with fermented milk are precisely representative of the milk processing technique developed in West Asia. In terms of cheesemaking, the western part of the Balkan Peninsula can be said to be the exact region where the European and West Asian cultures blended.

The milk fat fractionation from raw milk took the form of butter or butter oil depending on the region. Pastoralists stopped processing once they made butter in the cold climates of Europe, and they processed the butter into butter oil in the hot regions of West Asia. Even the milk fat fractionation in the western part of the Balkan Peninsula is also said to be characterized by a layering of milk cultures from Europe and West Asia.

There is much regional diversity in the western part of the Balkan Peninsula. This much diversity

in milk culture at a close range is very rare on the Eurasian continent. The western part of the Balkan Peninsula appears to be the intersection where the fermentation processes from West Asia crossed with the cheesemaking processes developed in Europe.

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### Note

a) *Kislo mleko* in Slovenian means “soured

milk”.

- b) *Kuhano maslo* in Slovenian means “cooked butter”.
- c) *Sirna zarna* in Slovenian means “small particle-like cheese”.
- d) *Mladi sir* in Slovenian means “young cheese”.
- e) *Zoryeni sir* in Slovenian means “ripened cheese” or “long-preserved cheese”.
- f) *Sirna gruda* in Slovenian means “coagulated lump cheese”.
- g) *Bohinjski plansharski sir* in Slovenian means “cheese processed in Bohinj area”.
- h) *Sirovi shtrukli* is the food cooked with skuta wrapped in pasta.

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## バルカン半島西部スロベニアの乳文化

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搾乳と乳加工は西アジアに誕生した。乳文化が西アジアからヨーロッパに伝わり、乳文化が発達する過程を再構築するにおいて、バルカン半島西部の乳文化は有益な情報を提供するものと考えられる。本稿の目的は、1) スロベニアにおける乳加工体系を明らかにすること、2) スロベニアの乳文化をヨーロッパと西アジアの乳文化と比較分析することにより、スロベニアの乳文化の特徴を把握することにある。バルカン半島西部のスロベニアの乳加工体系の特徴は、1) 非加熱殺菌の生乳を静置して自然発酵乳を加工すること、2) 生乳から最初にクリームを分離すること、3) クリームはチャーニングしてバターにし、地域によってはバターを加熱してバターオイルまで加工すること、4) 自然発酵乳を加熱・脱水・乾燥させて非熟成チーズを加工していること、5) アルプス地域ではレンネットを用いた熟成型チーズを加工していることであった。バルカン半島西部の乳加工の事例は、西アジアからヨーロッパに乳文化が伝播するに従って、発酵乳系列群からクリーム分離系列群へと変遷していったことを指し示していた。さらに、バルカン半島西部は、自然発酵乳と酸乳の両方を加工しており、ユーラシア大陸北方域と西アジアの乳加工技術に特徴的な技術が混在する乳文化となっていた。チーズ加工においても、発酵乳を脱水・乾燥させて加工する非熟成チーズとアルプス山脈で発達するレンネットを用いた熟成チーズを加工しており、バルカン半島西部はヨーロッパと西アジアの文化が混在している。バルカン半島西部は、西アジアに由来する発酵乳技術とヨーロッパで発達するチーズ加工とが正に交差した地点であると言える。