

# De caseo faciendo

## De caseo faciendo

Izvorni znanstveni rad  
Antička arheologija

Original scientific paper  
Roman archaeology

UDK/UDC 904:637.3.027–033.6(497.5Ivandvor)“652”  
637.3(497.5–3Slavonija)(091)

Primljeno/Received: 01. 05. 2010.

Prihvaćeno/Accepted: 09. 12. 2010.

*Potaknuti nalazom posude koja se tumači kao kalup – cjedilo za sir komparacijskom metodom pokušalo se prikazati kako se proizvodio sir u rimsko doba, a kako danas u kućnoj radinosti.*

*Ključne riječi: Rimsko doba, Ivandvor, sir, Columella, Plinius, Varro, rimska keramika, eksperimentalna arheologija*

*The find of a vessel interpreted as a mould/strainer for cheese inspired us to attempt a comparative reconstruction of the cheese-making process in the Roman period and the home-made cheese production of today.*

*Key words: Roman period, Ivandvor, cheese, Columella, Plinius, Varro, Roman pottery, experimental archaeology*

### Uvod

U probnim istraživanjima na lokalitetu Ivandvor (*Pannonia Inferior*) u neposrednoj blizini Đakova provedenim tijekom 2005. godine otkrivena je posuda ravnog dna s perforacijama na dnu i bočnim stjenkama (Lipovac Vrkljan, Šiljeg 2006: 13–19). Riječ je o maloj posudi unutrašnjeg promjera od oko 9,8 cm koja se koristila kao kalup odnosno cjediljka za sir. Na Ivandvoru je sljedeće godine otkriveno i istraženo rimsko seosko naselje (*vicus/pagus*) koje se datira od 2. polovice 2. st. do 4. st (Leleković 2007: 13–14; Balen et al. 2009: 35–45). U ovom radu osvrnut ćemo se na način kako se sir proizvodio u rimsko doba, koliki je bio njegov značaj u svakodnevnom životu Rimljana te usporediti izradu sira u rimsko doba s tradicijskim načinom tj. načinom kako se još i danas sir proizvodi u kućnoj radinosti.

### Sir u izvorima

Sir je bio izrazito važan u svakodnevnoj prehrani Rimljana što se najbolje vidi po sačuvanim receptima u kojima je glavni sastojak sir. Sir se nalazi u žrtvenom kruhu (*libum*) i kolačima (*placenta, spaerita, scribilita, erneum*), u kruhu s moštom (*mustaceus*) te u desertima (*seconda mensa*) kao što su okruglice i kolači od sira, meda i maka (*globi, savillum*) (Cato, *De agricultura* 74–79, 82, 84, 121) ili začinjene salate od sira i češnjaka (*Moretum, Appendix Vergiliana*).

Sir je bio i dio obavezne porcije (*ciba castrensia*) koju su vojnici nosili za vrijeme ratovanja, a najčešće se sastojala od svinjske slanine, pšenice, kiselog vina (*posca*) i sira (SHA, *Hadrianus*, 19, 2; SHA, *Avidius* 5, 3; Davies 1971: 124; Junkelmann

### Introduction

The 2005 test excavations at the site of Ivandvor (*Pannonia Inferior*) in the immediate vicinity of Đakovo led to the discovery of a flat-based vessel with a perforated base and side walls (Lipovac Vrkljan, Šiljeg 2006: 13–19). This small vessel, with an interior diameter of around 9.8 cm, was used as a cheese mould or strainer. The following year at Ivandvor saw the discovery and investigation of a Roman village settlement (*vicus/pagus*) dated from the second half of the 2<sup>nd</sup> cent. until the 4<sup>th</sup> cent. (Leleković 2007: 13–14; Balen et al. 2009: 35–45). In this work we shall look at the way cheese was made in the Roman period, at the role it played in the everyday life of the Romans, and we shall also compare the Roman-period cheese-making with the traditional method, i.e. the way cheese continues to be produced in traditional households.

### Cheese in literary sources

That cheese was extremely important for the everyday diet of the Romans is best seen in the preserved recipes where it was the main ingredient. Cheese has been found in sacrificial bread (*libum*) and cakes (*placenta, spaerita, scribilita, erneum*), in grape must bread (*mustaceus*) as well as in desserts (*seconda mensa*) such as dumplings or cakes made of cheese, honey and poppies (*globi, savillum*) (Cato, *De agricultura* 74–79, 82, 84, 121) or spiced cheese and garlic salads (*Moretum, Appendix Vergiliana*).

Cheese was also a part of the obligatory ration (*ciba castrensia*) that soldiers carried during wartime, which most often consisted of pork bacon, wheat, sour wine (*posca*) and cheese (SHA, *Hadrianus*, 19, 2; SHA, *Avidius* 5,3; Davies 1971: 124; Junkelmann 1997: 87; Ožanić 2005: 246). The exceptio-

1997: 87; Ožanić 2005: 246). Izrazito velika potražnja za sirom prisilila je i cara Dioklecijana da mu odredi maksimalnu cijenu pa tako saznajemo da je cijena jedne libre (327 g) svježeg sira bila 8 denara (Humphrey et al. 1998: 503; Fox, McSweeney 2004: 2).

U izvorima imamo odlično sačuvane podatke o proizvodnji sira.<sup>1</sup> Kolumela nam je ostavio nevjerojatno detaljan opis proizvodnje sira, te kaže da se sir treba raditi od što svježijeg punomasnog mlijeka jer ako se ostavi da stoji ili se izmiješa s vodom brzo poprima kiseli okus. Zgrušava se pomoću sirila (*coagulum*, rennet) od teleta ili jareta. Kada se lonac napuni mlijekom, ne smije stajati predugo prije zagrijavanja; isto tako lonac ne smije biti u kontaktu s otvorenim plamenom (što je popularna tehnika kod nekih ljudi) nego treba stajati pored vatre. U trenutku kada se tekućina počne grušati prebacuje se u pletena cjedila ili kalup, jer je jako bitno da se u prvom mogućem trenutku potpuno procijedi od guste tvari. Nakon što se sir odvoji iz košara ili cjedila smješta se na čiste daske u hladnom i mračnom mjestu kako bi se spriječilo kvarenje i tada se posoli da se izluči sirutka. Kada se stvrdne, ako se preša s punom snagom, postaje kompaktna. Ponovo se lagano posoli i pritisne utezima. Nakon što se ovaj proces ponavlja devet dana, sirevi se ispiru svježom vodom i slažu u redove na posebno oblikovane pletene police tako da se ne dodiruju, dok se malo prosuše. Da ne bi bili premekani spremaju se na nekoliko policica u zatvorenom prostoru zaštićenom od vjetra (*Columella, De agri cultura* 7.8.1; Humphrey et al. 1998: 164–165; Fox, McSweeney 2004: 2–3).

Varon kaže da sir od kravljeg mlijeka ima najviše hranjivih sastojaka, ali nakon što se pojedje teško se probavlja, sljedeći (po kvaliteti) je ovčji, dok kozji sir ima najmanje hranjivih sastojaka i najlakše se probavlja. Razlika je da li su sirevi mekani i svježiji ili suhi i stari: mekani sirevi su hranjiviji i manje zatvaraju, za razliku od starih, suhih sireva. Vrijeme kad se rade sirevi proteže se od dizanja Plejada u proljeće do ljetnih Plejada. U proljeće se mlijeko za sir muze u jutro, dok se u drugim godišnjim dobima muze oko podneva. Praksa nije potpuno ujednačena zbog lokalnih razlika i hrani. U dva kongija (3,3 l) mlijeka dodaje se sirilo veličine masline da se zgruša, bolje je (sirilo) od zeca ili kozlića nego od janjeta. Drugi koriste mlijeko od peteljke smokve i ocat, a također miješaju i različite sastojke koji se na Grčkom zovu *óπός* a ponekad *δάκρυον* (*Varro, De agri cultura*, 2.11.3–4).

Plinije uspoređuje vrste sira koje su najviše cijenjeni u Rimu, u kojem se razne dobre stvari od svih naroda mogu usporediti, te kaže da su najbolji sirevi iz provincije gdje je *Nemausus* (Nimes, Francuska). Posebno iz tamošnjih sela *Lesura* (danas Losere) i *Gabalis* (danas Gevaudan), ali njihova kvaliteta je kratkotrajna i moraju se pojesti dok su svježiji. S pašnjaka Alpa preporučuju se dvije sorte sira: Delmatske (Alpe) šalju doklejski sir, Ceutronske (Alpe) šalju vatusički sir. U Apeninima su vrste brojnije iz Ligurije imamo sir iz Cebe (*Ceba*) koji je uglavnom od ovčjeg mlijeka, u Umbriji imamo

nally high demand for cheese forced Emperor Diocletian to fix the maximum price, and we thus learn that a pound (327 g) of fresh cheese cost 8 denarii (Humphrey et al. 1998: 503; Fox, McSweeney 2004: 2).

Excellent information about cheese production is available from literary sources.<sup>1</sup> Columella left us an incredibly detailed description of the production of cheese. He states that milk used for the production of cheese should be as whole and fresh as possible, because it quickly turns sour if left to stand or is mixed with water. It is curdled with the addition of the rennet (*coagulum*) of a calf or a kid. As little time as possible should pass between the time the pot is filled with milk and its heating; likewise, the pot should not be in contact with an open flame (a popular technique with certain people), but rather stand by the fire. The moment the liquid begins to curdle it is transferred to wicker strainers or moulds, because it is crucial to strain it entirely from solid matter at the first possible instance. After the cheese is removed from baskets or strainers it is placed on clean boards in a cold and dark place in order to prevent spoiling, whereupon it is salted to remove the whey. When it hardens—and if pressed with full force—it becomes compact. It is then again slightly salted and pressed with weights. The same procedure is repeated over nine days, at the end of which cheeses are washed with fresh water and arranged in rows on specially formed wicker racks so as not to touch, to dry a little. To make sure cheeses are not too soft, they are placed on several racks in a closed space protected from wind (*Columella, De agri cultura* 7.8.1; Humphrey et al. 1998: 164–165; Fox, McSweeney 2004: 2–3).

Varro says that cheese made from cow's milk is the most nutritious, although it is difficult to digest. Sheep's cheese comes second (in quality), while goat cheese is the least nutritious and the easiest to digest. Cheeses are distinguished by whether they are soft and fresh or dry and old: soft cheeses are more nutritious and less constipating, in contrast to old, dry cheeses. The time of year when cheeses are made stretches from the rising of the Pleiades in the spring to the rising of the Pleiades in the summer. During spring, milk for cheese is expressed in the morning, whereas during the other seasons it is expressed around noon. Varieties in the practice are due to local differences and food. To curdle two *congii* (3.3 l) of milk one adds rennet the size of an olive; it is better (to use rennet) from hare or kid than from lamb. Others use fig's milk and vinegar, and mix into it also other ingredients that in Greek are called *óπός* and sometimes *δάκρυον* (*Varro, De agri cultura*, 2.11.3–4).

Pliny compares the cheese types that are valued the most in Rome, where various goods from all peoples can be compared, and he says that the best cheeses come from the province in which *Nemausus* (Nimes, France) lies. This is particularly true of the local villages of *Lesura* (presently Losere) and *Gabalis* (the Gevaudan of today), but their quality is short-lived and they have to be eaten while fresh. From the Alpine pastures two types of cheese are recommended: the Dalmatian (Alps) dispatch Diocletian cheese, while the Centronian (Alps) ship the *vatusicum* cheese. In the Apennines the types are more numerous: from Liguria we have the cheese from *Ceba*, made mostly of sheep's milk; in Umbria we have the one from *Æsina*, while from the town of *Luni*,

<sup>1</sup> Prijevod je slobodan, korišteni su Internet online baze podataka i Lacus Curtius, Latin Library <http://penelope.uchicago.edu/Thayer/L/Roman/Texts/30.4.2010.>; <http://www.thelatinlibrary.com/30.4.2010>.

<sup>1</sup> Translation is liberal, the online databases Latin Library and Lacus Curtius were consulted. Library <http://penelope.uchicago.edu/Thayer/L/Roman/Texts/30.4.2010.>; <http://www.thelatinlibrary.com/30.4.2010>.

onaj iz Esine (*Æsina*), a s granice Etrurije i Ligurije odličan je sir iz grada Lune (*Luni*), poseban zbog svoje veličine, jedan sir teži skoro 1000 libri. Blíže Gradu (Rimu), imamo sir Vestina (*Vestinum*), a najbolji od te vrste dolazi s teritorija gdje je *Ceditium*. Koze također proizvode odličan sir koji se u posljednje vrijeme jako cijeni, a njegov se okus pojačava dimljenjem. Sir te vrste koji se radi u Rimu bolji je od ostalih; zbog toga što onaj proizveden u Galiji ima snažan okus, kao lijek. Od sireva koji se rade preko mora bitinijski (*Bithynia*, Mala Azija) se smatra prvim po kvaliteti. Sol postoji u pašnjacima što je vidljivo jer kako (sir) stari, dobiva slankasti okus, ali ne pretjerano, isto tako je poznato da će sir povratiti svoj originalni svježí okus ako se umoči u mješavinu timijana (majčine dušice) i octa. Rečeno je da je Zoroaster živio trideset godina u divljini na siru, pripremljenom na tako poseban način da je bio neosjetljiv na starenje (*Plinius, Naturalis Historia* XI, 97).

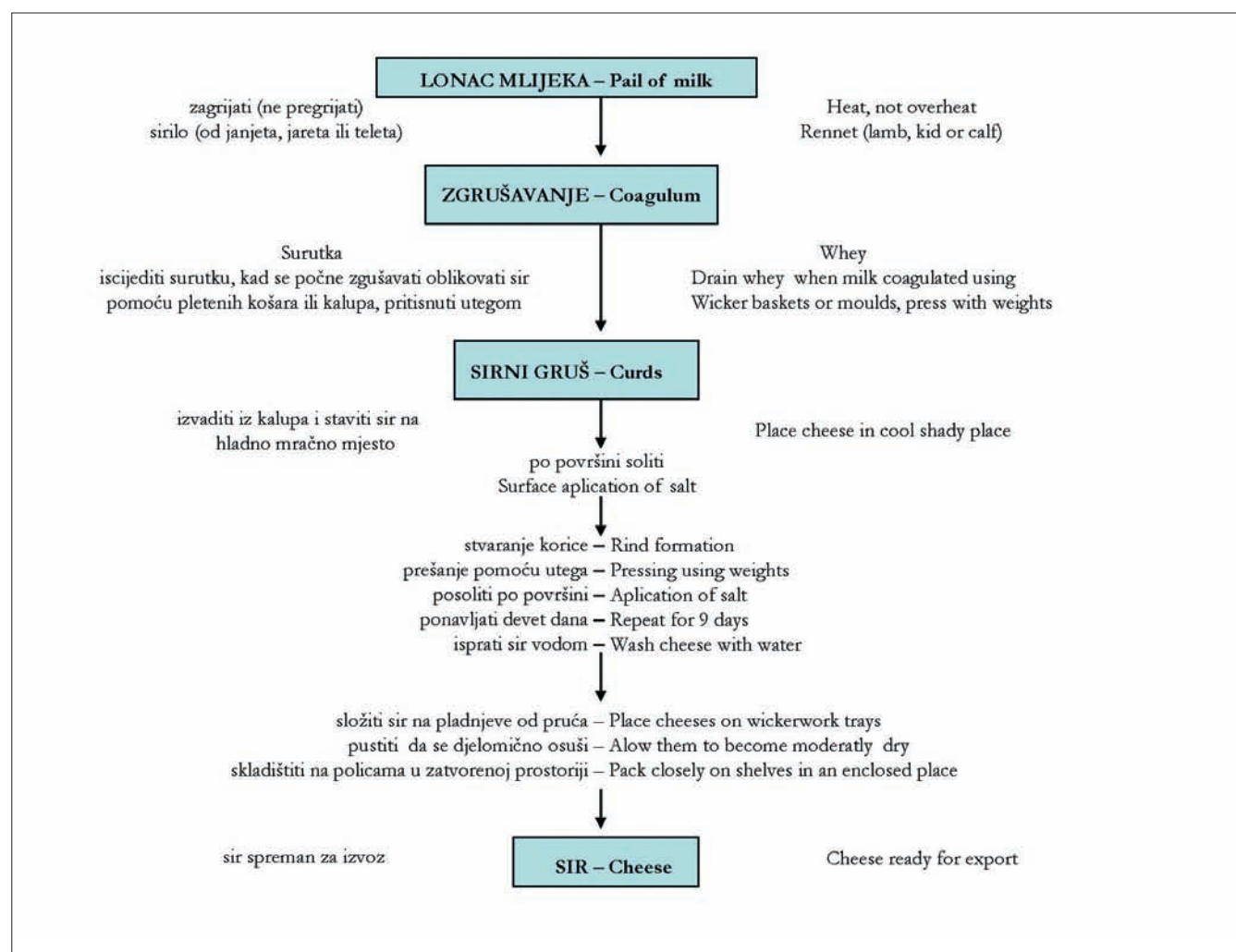
### Proces izrade sira

Proces izrade sira (sl. 1) koji nam opisuje Kolumela ne razlikuje se od načina kako se sir radi i danas. Prema kazivanju Nede Roguljić sir u kućnoj radinosti kojeg ona naziva "Sir

at the border between Etruria and Liguria, comes an excellent cheese, distinctive for its size, each weighing nearly a 1000 pounds. Moving closer to the City (Rome) we have the *Vestinum* cheese, with the best of its kind coming from the territory of *Ceditium*. Goats also make excellent cheese, which has recently been valued highly, and whose flavour is enhanced by smoking. Cheese of this type that is made in Rome is better than the others; because that produced in Gaul has a strong flavour, like medicine. Of the cheeses produced overseas, the pride of place in quality is reserved for the one from Bithynia in Asia Minor. The pastures obviously contain salt, because as (the cheese) matures, its flavour turns more salty, but not excessively; it is also known that it will regain its original fresh flavour if soaked in a mixture of thyme and vinegar. It is said that Zoroaster lived thirty years in the wilderness solely on cheese, prepared in a manner so special that it rendered him immune to aging (*Plinius, Naturalis Historia* XI, 97).

### The cheese-making process

The cheese-making process (Fig. 1) described by Columella is not different from that still used today. According to the information by Neda Roguljić, homemade cheese—which she refers to as "rennet cheese"—is most often made from 5



Sl. 1 Proces dobivanja sira (prema Columella, *De agri cultura* 7.8.1; Humphrey et al. 1998: 164–165; Fox, McSweeney 2004: 2–3)  
Fig. 1 Cheese-making process (after Columella, *De agri cultura* 7.8.1; Humphrey et al. 1998: 164–165; Fox, McSweeney 2004: 2–3)

od sirišta“ najčešće se radi od 5 litara mlijeka.<sup>2</sup> Mlijeko mora biti mlako kao da je tek pomuzeno. Temperatura ne smije biti više od 35 stupnjeva. Na 5 litara mlijeka stavlja se jedna žlica sirila. Mlijeko mora odstajati na slaboj vatri dok se sirutka počne stvarati bez kuhanja. Promiješa se svakih pola sata dok ne izađe sva sirutka. Iscijedi se i stavi u kalup, a kada se “stegne” izvadi se iz kalupa i posoli s jedne pa s druge strane. Nakon 24 sata se opere i ostavi da se osuši. Potrebno je svaki dan okretati dok se suši. Kako vidimo prema izvorima sirilo se dobiva ekstrakcijom želudaca malih preživača. To se sirilo danas naziva rennet i u njemu se nalaze enzimi koji pospješuju grušanje mlijeka. Kupuje se u tekućem obliku, ali sirilo koje spominje Varon je veličine masline što nas upućuje da je vjerojatno bilo u krutom stanju možda djelić želuca (Fox, McSweeney 2004: 3). Kolumela isto tako upozorava da se mlijeko za sir ne smije pregrijati nego predlaže da ga se stavi pokraj vatre.

Varon spominje i sir od octa koji se također radi u tradicijskom sirarstvu. Prema kazivanju N. Roguljić radi se od 5 litara mlijeka koje se kuha dok ne zavre. Doda se dvije žlice octa i dalje se grije dok se ne počne stvarati vodica (sirutka). Vatra se smanji te se kuha još od 5 do 10 minuta da postane malo tvrde. Ohladi se da bude mlako i onda se izlije sirutka i zasoli se prema ukusu (oko pola žlice). Iscijedi se kroz gazu i stavi se u kalup ili cjediljku. Kad se stegne stavi se sušiti. Može se sušiti ili konzumirati kroz jedan dan.

Varon spominje od kada do kada je najbolje raditi sir tj. od Plejada koje se dižu u proljeće do Plejada u ljeto. Plejade se podižu sredinom svibnja, a ljeti su također dominantno zvijezde. Od proljeća do ranog ljeta je paša najbolja što se može povezati i s praćenjem kretanja Plejada. U tom je periodu mlijeko rjeđe i sir koji se radi od rjeđeg mlijeka je “lakši”, dok u je sušnom razdoblju mlijeko gušće i sir je “teži” (kazivanje N. Roguljić). Paša je svakako izuzetno značajna u izradi sira što kako vidimo ističe i Plinije stariji govoreći kako je bitinijski sir odličan upravo zbog paše koja je u ovom slučaju slanija.

### Kalup iz Ivandvora

Kalup koji se koristi u tradicijskom sirarstvu je dvodijelan i pomičan, te ima svojevrstu stegu koja pritišće drveni ravni poklopac. Izvori kažu da su Rimljani sir pritiskali utezima, a smještali su ih u pletene košare ili kalupe. Pletene košare nam nisu sačuvane, no predmet koji je potaknuo pisanje ovog rada je vjerojatno služio kao kalup ili/i cjedilo za sir. Kalup iz Ivandvora je mali, unutrašnjeg promjera oko 9,8 cm (sl. 2, 3). Perforacije u dnu i stjenkama su služile za cijeđenje sirutke iz sirnog gruša. Kolumela govori da se trebaju postaviti utezi na sir. Vrlo je vjerojatno da je morao postojati nekakav ravni poklopac na koji bi se postavili utezi. Prema do sada objavljenim podacima posude s ravnim dnom i perforacijama na dnu i stjenkama nađene su u Vinkovcima (*Cibalae*), Srijemskoj Mitrovici (*Sirmium*), Gomolavi, Progaru te u rustičnim vilama Prosina i Kudoš datirane od 2. do 3. st. Kako vidimo u Donjoj Panoniji nalažene su i u seoskim i gradskim cjelinama što nas upućuje na široku upotrebu ovakvih posuda. Posude variraju u svojoj veličini od 22 cm u promjeru do 9 cm, no i u izvorima saznajemo da su sirevi bili različitih dimenzija (Brukner 1981: T. 99: 1–6, 8; 1995: T. III: 27, T. IX 84; Ožanić 2004: 114, T. 69: 9, T. 22: 18).

Prema današnjim spoznajama u kalupu promjera 14 cm ako se napravi sir od 4 l mlijeka dobije se sir od oko 1 kg. Sušenjem se stisne te mu je nakon tri mjeseca težina oko 70 dkg. Prema tim podacima od jednog kongija (3,3 l) mlijeka

litres of milk.<sup>2</sup> The milk has to be lukewarm, like that freshly expressed. Its temperature must not exceed 35 degrees. A spoonful of rennet is added to 5 litres of milk. The milk must remain on low heat until whey is formed without boiling. It is stirred in half-hour intervals until all the whey is removed. It is strained and put in a mould, and when it “tightens” it is removed from the mould and salted first on one side and then on the other. After 24 hours it is washed and left to dry. While drying, it has to be turned every day. As literary sources tell us, rennet is obtained from the stomachs of small ruminants. It contains enzymes that facilitate milk coagulation. It can be procured in liquid form, but rennet mentioned by Varro is olive-sized, which tells us that it was solid, perhaps a part of a stomach (Fox, McSweeney 2004: 3). Columella also cautions that the milk for cheese must not overheat, advising to place it near a fire.

Varro mentions also cheese from vinegar, also known in traditional cheese-making. According to the information of Neda Roguljić, it is made from 5 litres of milk, which is cooked until it boils. Two spoons of vinegar are added and the cooking continues until whey is formed. Fire is then reduced and cooking continues for 5 to 10 minutes to make it a little harder. It is cooled until it is lukewarm whereupon the whey is drained and salt is added according to taste (around half a spoon). It is strained through a gauze and placed in a mould or a strainer. When it tightens it is put to dry. It can then dry or be consumed after a day.

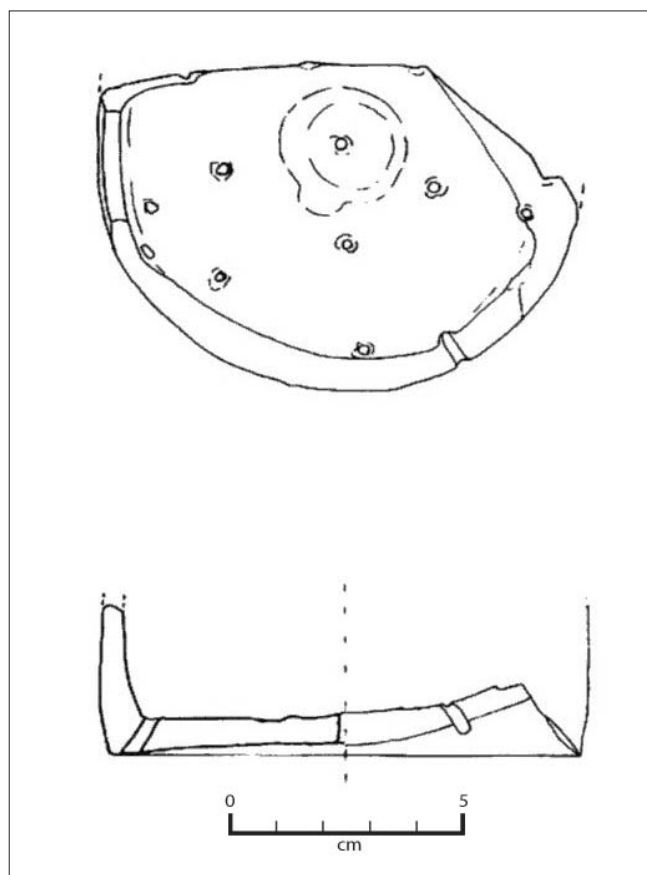
Varro mentions the most appropriate period for making cheese, i.e. from the spring rising of the Pleiades until their rising in the summer. The Pleiades rise around the middle of May, and during the summer they are one of the dominant constellations. The pasture is best from spring to early summer, which can be related to the monitoring of the movement of the Pleiades. During that period the milk is thinner and the cheese made from thinner milk is “lighter”, while in the dry period the milk is denser and the cheese is “heavier” (information by N. Roguljić). Pasturage is definitely extremely important in cheese-making, as stressed also by Pliny the Elder when he says that the Bithynian cheese owes its excellent flavour precisely to grazing, which is in this case salty.

### The mould from Ivandvor

Moulds used in traditional cheese-making are movable and consist of two pieces, and are fitted with a clamp of sorts that presses on the flat wooden lid. Sources tell us that the Romans pressed cheese with weights, and placed them into wicker baskets or moulds. Woven baskets are not preserved, but the object that motivated us to write this paper was probably used as a mould or/and cheese strainer. The mould from Ivandvor is small, its interior diameter around 9.8 cm (Fig. 2, 3). The perforations in the base and side walls served for straining the whey from the curd. Columella says that weights have to be placed on the cheese. It is very likely that a flat lid was used on which weights would be placed. According to the data published so far, flat-based vessels with perforations on the base and walls were found in Vinkovci (*Cibalae*), Srijemska Mitrovica (*Sirmium*), Gomolava, Progar and in *villae rusticae* of Prosina and Kudoš, dated from the 2<sup>nd</sup> to 3<sup>rd</sup> cent. AD. As we can see, in Lower Pannonia they were found both in rural and urban contexts, which indicates that such vessels were in widespread use. The size of the vessels varies from 22 cm in diameter to 9 cm, but we also know from the

2 Kazivačica Neda Roguljić živi u selu Gardun pokraj Trilja.

2 Informant Neda Roguljić lives in the village of Gardun near Trilj.



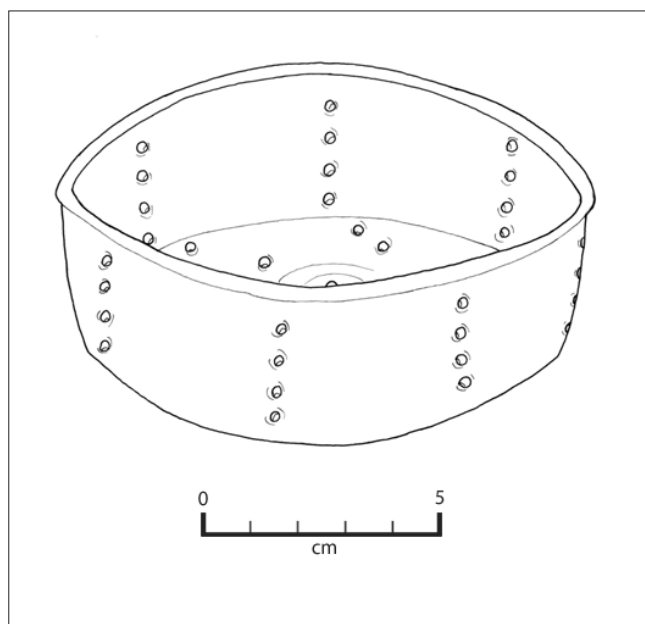
Sl. 2 Cjedilo–kalup za sir, Ivandvor, promjer dna: 10 cm, debljina stijenki: 0,4 cm, sačuvana visina 3,3 cm, boja gline siva GLEY 1 6/ gray, ne može se zarezati noktom, bez primjesa (crtež: Suzana Čule)

Fig. 2 Strainer/mould for cheese, Ivandvor, diameter of base: 10 cm, wall thickness: 0.4 cm, preserved height: 3.3 cm, colour of clay GLEY 1 6/ grey, cannot be scratched by a fingernail, without additions (drawing by Suzana Čule)

dobije se sir od oko 2 libre tj. 654 gr. Prema Katonu upravo su dvije libre sira potrebne za izradu rimskog žrtvenog kruha (*libum*) (Katon, *De agricultura*, 75), a prema Dioklecijanovim cijenama takav je sir koštao 18 denara.

Izrada kvalitetnog sira smatra se svojevrsnom majstorstvom i danas, a kao što smo vidjeli tako je bilo i kod Rimljana. Sam proces nije do danas doživio velike promjene, a neka su područja koja spominju izvori i danas poznata po kvalitetnim sirevima. Tekst *Expositio totius mundi et gentium* iz 4. st. navodi da je sir iz Dalmacije bio izvozna roba i korisna stvar (*Expositio totius mundi et gentium* 53.7; Woodman 1964: 40; Glicksman 2005: 210). Pismeno svjedočanstvo o proizvodnji sira u Panoniji nije nam sačuvano, a sam sir i pletene cjediljke su arheološki nevidljive. O proizvodnji sira tako saznajemo isključivo iz keramičkih ulomaka. Nalazi posuda koje smatramo cjediljkama–kalupima za sir na području Panonije daju nam naslutiti proizvodnju koja je morala podmiriti barem lokalne potrebe za ovim proizvodom. Prehrana u kojoj je sir izrazito zastupljen zahtijeva i znatnu proizvodnju te se u rimskim seoskim imanjima sir morao proizvoditi velikom broju i kao takav služiti i kao roba kojom se trgovalo, prerađivalo i koristilo u svakodnevnoj prehrani.<sup>3</sup>

<sup>3</sup> U zaštitnim arheološkim istraživanjima seoskih naselja u Ivandvoru i Starim Perkovcima također su nađeni kalupi za sir, rad na njihovoj obradi je u tijeku. Zahvaljujem T. Lelekoviću i I. Hirschler na uvidu u materijal.



Sl. 3 Rekonstrukcija posude prema analognom materijalu (crtež: Suzana Čule)

Fig. 3 Reconstruction of the vessel after analogous material (drawing by Suzana Čule)

sources that cheeses came in various dimensions (Brukner 1981: T. 99: 1–6, 8; Brukner 1995: T. III: 27, T. IX 84; Ožanić 2004: 114, T. 69: 9, T. 22: 18).

According to the current knowledge, 4 l of milk in a mould 14 cm in diameter will yield a cheese of ca 1 kg. Drying renders it more compact, so after three months its weight is around 70 dag. According to these data, one *congius* (3.3 l) of milk will produce a cheese of around 2 pounds, i.e. 654 g. According to Cato, two pounds of cheese is precisely the amount needed to make Roman sacrificial bread (*libum*) (Katon, *De agricultura*, 75), while by Diocletian's prices this cheese cost 18 *denarii*.

The production of good-quality cheese is considered an art even today, and as we have seen the case was the same with the Romans. The process itself has not undergone substantial changes, and some of the areas mentioned in the sources are renowned for their cheeses even today. The 4<sup>th</sup> cent. text *Expositio totius mundi et gentium* asserts that cheese from Dalmatia was an exported good and a useful thing (*Expositio totius mundi et gentium* 53.7; Woodman 1964, 40; Glicksman 2005, 210). We have no written evidence about cheese production in Pannonia, and the cheese itself or the woven strainers are archaeologically invisible. We can thus learn about cheese-making exclusively from ceramic fragments. The finds of vessels that we consider to be strainers/moulds for cheese in the territory of Pannonia allow us to reckon with a production that must have satisfied at least the local demands for this product. The diet in which cheese occupies a prominent place requires a substantial output, so cheese must have been produced in large quantities on Roman rural estates, and as such must have been used as merchandize that was traded, processed and used in everyday diet.<sup>3</sup>

<sup>3</sup> The salvage archaeological investigations of rural settlements in Ivandvor and Stari Perkovci likewise yielded moulds for cheese, which are currently being analyzed. I thank T. Leleković and I. Hirschler for permission to inspect the material.

## IZVORI / SOURCES

- Marcus Porcius Cato Censorius, De agricultura* (Marko Porcije Katon Cenzor, O poljopivredi), <http://www.thelatinlibrary.com/cato.html> (20.12.2010.).
- Lucius Iunius Moderatus Columella, De re rustica* (Lucije Junije Moderat Kolumela, O seoskim poslovima), <http://www.thelatinlibrary.com/columella.html> (20.12.2010.).
- Edictum Diocletiani, Edictum de pretiis venalium rerum* (Dioklecijanov edikt, Edikt o cijenama prodajne robe).
- Historia Augusta* (Carska povijest), <http://www.thelatinlibrary.com/sha.html> (20.12.2010.).
- Expositio totius mundi et gentium*, (Prikaz cijeloga svijeta i naroda). <http://etd.ohiolink.edu/send-pdf.cgi/Woodman%20Jesse.pdf?osu1166462501> (20.12.2010.).
- Gaius Plinius Secundus Maior, *Naturalis historia* (Gaj Plinije Sekundo stariji, Prirodoslovlje), <http://www.thelatinlibrary.com/pliny1.html> (20.12.2010.).
- [http://www.muellerscience.com/SPEZIALITAETEN/Schweiz/Pliny\\_caeusus.htm](http://www.muellerscience.com/SPEZIALITAETEN/Schweiz/Pliny_caeusus.htm) (20.12.2010.).
- [http://penelope.uchicago.edu/Thayer/E/Roman/Texts/Pliny\\_the\\_Elder/home.html](http://penelope.uchicago.edu/Thayer/E/Roman/Texts/Pliny_the_Elder/home.html) (20.12.2010.).
- Marcus Terentius Varro. Res rusticae* (Marko Terencije Varon, Seoski poslovi), <http://www.thelatinlibrary.com/varro.html> (20.12.2010.).
- Appendix Vergiliana, Moretum* (Vergilijev dodatak, Moretum), <http://virgil.org/appendix/moretum.htm> (20.12.2010.).
- [http://www.hs-augsburg.de/~harsch/Chronologia/Lsante01/Vergilius/ver\\_apmo.html](http://www.hs-augsburg.de/~harsch/Chronologia/Lsante01/Vergilius/ver_apmo.html) (20.12.2010.).

## LITERATURA / BIBLIOGRAPHY

- Balen, J., Bilić, T., Bunčić, M., Drnić, I., Solter, A. 2009, Rezultati zaštitnih istraživanja na lokalitetu Ivandvor – Šuma Gaj, *Vjesnik Arheološkog muzeja u Zagrebu*, XLII, 23 – 72.
- Brukner, O. 1981, *Rimska keramika na jugoslavenskom dijelu provincije Panonije*, Beograd.
- Brukner, O. 1995, Rimska naselja i vile rustike, in: *Arheološka istraživanja duž autoputa kroz Srem*, Vapa Z. (ed.), Novi Sad, 136–180.
- Davies, R. W. 1971, The Roman Military Diet, *Britannia*, Vol. II, 122–142.
- Fox, P. F., McSweeney, P. L. H. 1998, An Overview, in: *Cheese: Chemistry, Physics and Microbiology*, Vol. 1, Cork, 1–18.
- Glicksman, K. 2005, Internal and External Trade in the Roman Province of Dalmatia, *Opuscula Archaeologica*, 29, 189–230.
- Humphrey, J.W., Oleson, J. P., Sherwood, A. 1998, *Greek and Roman Technology. A Sourcebook. Annotated translations of Greek and Latin texts and documents*, London/New York.
- Junkelmann, M. 1997, *Panis Militaris, Die Ernährung des römischen Soldaten oder der Grundstoff der Macht*, Mainz am Rhein.
- Leleković, T. 2007, Ivandvor, *Hrvatski arheološki godišnjak*, 4, 12–15.
- Lipovac Vrkljan, G., Šiljeg, B. 2006, Probna istraživanja na lokalitetu Ivandvor na trasi autoceste 5C 2005, *Annales Instituti Archaeologici*, II, 13–19.
- Ožanić, I. 2004, *Tipologija rimske keramike iz Vinkovaca*, Sveučilište u Zagrebu, Zagreb (magistarski rad).
- Ožanić, I. 2007, Prehrana rimskog vojnika - Nova svjedočanstva iz Tilurija, in: *Simpozij rijeka Krka i nacionalni park Krka, Prirodna i kulturna baština, zaštita i održivi razvitak*, Marguš D. (ed.), Šibenik, 245–249.
- Woodman, J. E. 1964, *Expositio totius mundi et gentium, Its Geography and Language*, The Ohio State University, Columbus (disertacija).
- SHA - *Historia Augusta*, prijevod, D. Nečas Hraste, Zagreb, 1994.