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BUILT ON BONES: WASTE RECYCLING IN THE UKRAINIAN SSR IN THE 1920S–EARLY 1930S

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Aim of the article – to analyse the formation of state policies on the bone recycling in early Soviet Ukraine, focusing on the needs of Soviet industry, collection spaces, methods and challenges, key actors, and the relationships between them during this activity. **Novelty of the study** lies in the absence of a dedicated, in-depth analysis of bones as a resource, which this article seeks to address. **Methodology:** the study is based on documents from Ukrainian archives previously unused in scholarship, materials from Soviet press and popular science literature of the period, and statistical collections. **Conclusions:** It is concluded that the case of bone collection is indicative of the early Soviet resource management system and serves as a small-scale model of the organization of waste recycling in the 1920s–early 1930s. It is shown that during this period the USSR began developing a model of resource extraction from the periphery, as waste was considered a valuable resource equivalent to grain, forests, coal, gas, and water. Continuity with Russian Imperial collection practices is identified, alongside a demonstrated link between industrialization, urbanization, and the emergence of new collection spaces and methods in the Ukrainian SSR. It is demonstrated that even during the NEP period, the administrative model of recycling illustrates the authorities' efforts to control resource flows through a planned economy and hierarchical management, involving both state and private collectors. At the same time, incompatible approaches, imbalances between collection costs and procurement prices, and low motivation among workers and the population led to systemic problems, plan failures, and intense competition among collectors, who functioned simultaneously as partners and competitors. It is concluded that while the economic efficiency of early Soviet bone recycling remains questionable, the practice clearly served important political functions: it subordinated the republic's economy to central directives, demonstrated the mobilization potential of peripheral resources, and showcased the Soviet system's capacity to effectively organize and utilize them.

Keywords: bones, waste, recycling, USSR, Ukrainian SSR, NEP, administrative-planning system.

НА КІСТКАХ: ВТОРИННЕ ВИКОРИСТАННЯ ВІДХОДІВ В УКРАЇНСЬКІЙ РСР У 1920-Х–НА ПОЧАТКУ 1930-Х РОКІВ

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Мета статті – проаналізувати становлення державної політики вторинного використання кісток у ранньорадянській Україні з акцентом на потреби радянської промисловості, простори, методи та проблеми збирання, головних акторів та відносини між ними під час цієї діяльності. **Новизна дослідження** полягає у відсутності спеціального ґрунтовного аналізу, присвяченого саме кісткам, тому стаття заповнює існуючу наукову прогалину. **Методологія:** основою розвідки стали документи українських архівів, що раніше не вводилися в науковий обіг, матеріали радянської преси та науково-популярної літератури відповідного періоду, а також статистичні колекції. **Висновки:** Зроблено висновок, що кейс збирання кісток є показовим з перспективи ранньорадянської системи управління ресурсами та відображає в мініатюрі організацію ресайклінгу відходів у 1920-х – на початку 1930-х років. Показано, що вже в цей період у СРСР формувалася модель видобутку ресурсів із периферійних республік, де відходи розглядалися як цінний ресурс нарівні із зерном, лісами, вугіллям, газом і водою. Виявлено тяглість практик збору до традицій Російської імперії та одночасно показано зв'язок між індустріалізацією, урбанізацією та появою нових просторів і методів збирання відходів. Показано, що навіть у період НЕПу адміністративна модель ресайклінгу демонструвала прагнення влади контролювати потоки ресурсів через планову економіку та вертикаль управління, залучаючи державних і приватних заготівельників. Водночас несумісні підходи, дисбаланси між собівартістю та закупівельною ціною, низька мотивація працівників і населення призводили до системних проблем, невиконання планів та гострої конкуренції

між заготівельниками, які одночасно були партнерами і конкурентами. Поставлено питання про економічну ефективність ранньорадянського ресайклінгу кісток, яка компенсувалася важливою політичною функцією: підпорядкування економіки республіки директивам центру, демонстрацію мобілізаційного потенціалу периферійних ресурсів та спроможності радянської системи їх ефективно залучати.

Ключові слова: кістки, відходи, вторинне використання, СРСР, Українська РСР, НЕП, адміністративно-планова система.

1. Introduction

"*The death of livestock, caused by the [First World] War, economic ruin, food disorder, and crop failures, led to the mass accumulation of bones in ditches, ravines, and urban dumps. This occurred precisely at the time when the reduction in livestock numbers diminished the production of horse and manure fertilizer, which negatively affected future harvests. At the same time, bones, if burned to ash, produce an artificial fertilizer no worse than other types. Thus, there is an opportunity to at least partially compensate for the damage inflicted on agriculture by the mass death of livestock over the past seven years. One must simply not neglect this matter and organize the collection of bones on the broadest possible scale" –*

this is how bone collection began in the Ukrainian SSR in the early 1920s (Orhanizujte zbyrannya pokyd'kiv 1922:1).

These and other pages of the history of developing waste-recycling practices in the early Soviet Ukraine have so far been largely overlooked by researchers. This article aims to partially address this scholarly gap using the case of the Ukrainian SSR. Covering this topic allows us to gain deeper insights not only into Soviet resource policies and the relationship between the center and the periphery through the lens of waste reuse but also to reveal the connection between economy, ideology, and everyday practices in Ukraine during the formative period of the Soviet system.

The aim of this article is to analyze the practices of bone collection in the Ukrainian SSR during the 1920s–early 1930s. The study examines the role of bones in the Soviet economy, explores the spaces and methods of their collection, and identifies the main actors as well as the relationships that developed among them in the process of fulfilling state tasks.

The source base of the research includes archival documents of organizations engaged in waste collection, many of which have not yet been introduced into scholarly circulation; Soviet popular science literature on the problems of waste reuse; statistical compilations containing data on collection plans for various types of waste; and materials from the Soviet press that covered the process of bone collection. Given that neither the Russian Empire nor the USSR maintained specialized statistics on waste, and that certain archival materials (in particular for 1933) are altogether missing, the information preserved is somewhat fragmentary. At the same time, these sources make it possible to trace key trends and reconstruct the broader picture of the development of the waste recycling system in Ukraine in the 1920s–1930s.

2. Analysis of sources and literature

In contemporary historiography, bones are generally considered within the broader context of waste recycling policies. For the first half of the twentieth century, the best-studied case is bone procurement in the Third Reich. Heike Weber and Chad Denton, in their article "Bones of Contention: The Nazi Recycling Project in Germany and France during World War II," examine bones as an important material resource for the development of Germany's wartime economy, particularly for the chemical industry on the eve of and during the Second World War (Denton, Weber, 2018). In a study by Elisabeth Vaupel and Florian Preiß, the authors show how German schoolchildren were encouraged to collect bones and deliver them to reception points organized in schools as part of the 1936 Four-Year Plan and the policy of self-sufficiency (Vaupel, Preiß, 2018). Numerous other, though scattered, references can also be found in many other works on waste recycling in Nazi Germany.

As for the Soviet Union and its republics, particularly Ukraine, this topic remains almost entirely unexplored. Some fragmentary evidence can be found in the author's studies devoted to the formation of the early Soviet waste management system in the republic (Perga, 2024(A)), the recycling of rags (Perga, 2023), and paper collection (Perga, 2025). Iryna Skubii mentions bones as a form of waste that people consumed in the territories of Ukraine affected by the Holodomor of 1932–1933 (Manley, Skubii, 2022). This underscores the need for a dedicated study of bone collection in early Soviet Ukraine as a representative case of the USSR, one that makes it possible to reconstruct not only the local context but also the broader trends that were taking shape across the entire union.

3. Presentation of the main material

The practice of bone collection has a long history and, for centuries, was widespread in various countries due to shortages of raw materials, including in the Russian Empire. However, information about its occurrence in the territories of Ukraine is extremely limited. While bones were used by the population as fertilizer, the main driver of their mass collection from the 1830s onward was the demand of sugar-beet factories, following the discovery of their bleaching and filtering properties (Minc, 1930). By the late nineteenth century, the Russian Empire had 72 bone-processing factories of national significance in 49 locations (excluding artisanal enterprises), the majority of which were concentrated in coastal and border cities such as Riga, Kovno, Panevėžys, Grajewo, Warsaw, Łazy,

Sosnowiec, Taganrog, Rostov, and various locations in Finland. Approximately six million poods of bones, worth 1.5 million rubbles, were collected annually across the empire.

Factories located in Ukraine – in Kyiv, Fastiv, Vasylkiv, Rzhyshchiv, Berdychiv, Poltava, Mykolaiv, Kherson primarily served the needs of the local sugar industry, while integration into the empire-wide and export markets remained minimal. The only factory of all-empire significance was in Odesa, producing glue and fertilizers that were transported by rail and waterways (mainly the Dnipro and Desna rivers) to other cities. Bone collection was carried out by the poorest strata of the population predominantly women and children, most of whom lived beyond the Pale of Settlement and were Jewish, those who left the arena of social immorality (former prostitutes), village peasants seeking work in commercial centers, or desperate urban proletarians of all sorts, but certainly of the lowest order (Obshhestvo kosteobzhigatel'nyh zavdov 1890: 12–16).

4. Drivers and actors

The raw material crisis of the early 1920s forced Soviet officials, economists, and industrial managers to reconsider approach to waste.

"After seven years of war and revolution, we have become terribly impoverished. We have neither manufacturing nor paper, no plows, livestock, sugar, not even bread. Therefore, in such poverty, it would be strange if we did not try to use all our natural resources… But while some resources, like paper, ore, coal, wood, and hemp, require arduous labour to extract, there are also items whose collection costs almost nothing… for example, bones, rags, medicinal wild plants, horns, hooves, and so on. All of this is scattered across the vast expanses of the country and seems worthless to anyone. Yet if gathered in significant quantities, it can form a substantial fund for supplying entire industries: rags for paper mills, intestines for sausage workshops, herbs for pharmaceutical enterprises, and so on," –

wrote a correspondent for the newspaper Visti in 1922, urging the organization of bone collection for sugar factories and the production of manure to fertilize the land (Orhanizujte zbyrannya pokyd'kiv 1922: 1). The significant potential of waste led to its positioning as a valuable resource, often called "gold in the garbage" or other similar epithets.

Compared to the Russian Empire, the Soviet Union expanded the range of bone utilization. Bone glue began to be used in textile factories and construction, while bone fat was employed in soap production. Bones were also processed into everyday goods such as combs, knives, buttons, toothbrushes, and women's jewelry (Minc: 8). By the late 1920s, Soviet scientists had determined that one ton of raw bones could yield: 12.5–23.5% fat, 7.5–10% glue, 2.5–3.5% gelatin, and 23.5–43% bone meal. Drawing on foreign experience, they also began researching the use of bones in the food industry for the production of soup concentrates. When added to liquid vegetarian soups, the hydrolyzate made them "hearty, velvety, and imparted a pleasant mushroom flavour". Beyond seasoning vegetarian soups, it was also used as a base for a variety of sauces (Lobanov, Kochetkova 1930: 16).

However, the main driver of the revival of bone utilization in the early 1920s was the sugar industry. The accumulation of large quantities of waste, including bones, created favourable conditions for their collection and secondary use. During the New Economic Policy – NEP (1923–1928), state-owned sugar enterprises, which were only beginning to recover from the destruction caused by war and its aftermath, were forced to purchase raw materials primarily from private entrepreneurs. This made them dependent on the "NEPmen" – a new bourgeois stratum that emerged in the USSR due to the temporary return of market relations. This situation caused not only economic losses for the state but was also viewed as undesirable from an ideological perspective.

To reduce this dependence and to develop and organize state sugar production, the state Sugar Trust, established in 1922, created in 1925 the Superphosphate combinate, which built blast furnaces at the Odesa Bone Processing Plant to calcine bones and produce bone charcoal. Later, the plant became part of the Chemical Trust, which became the main purchaser of bones for both the food and chemical industries. It can be concluded that state industry was the primary consumer of bones in early Soviet Ukraine, absorbing most of the supply, although small private enterprises – artels – also existed, using smaller batches for their own needs.

It should be emphasized that the 1920s marked a period when waste-related operations were extremely widespread in Ukraine. These activities were carried out by private individuals as well as entrepreneurs and industrial enterprises. The latter, in particular, felt the shortage of resources acutely due to the raw material crisis, so waste acquired new value and began to be seen as an important substitute for traditional raw materials. Analysis of archival documents gives the impression that a "waste fever" engulfed all strata of Ukrainian society. Even bank employees formed artels and collected waste in their spare time. Buying and selling waste became a means of survival for many people and even enterprises during difficult times. In this context, it is worth noting the continuity with practices in the Russian Empire, where the collection of rags and bones was highly prevalent.

At the same time, small collectives and individual actors operating independently, as well as the collection apparatus of the Superphosphate combine, were unable to meet the needs of the state sugar industry or other industries that required diverse types of waste.

To address this, the Ukrainian joint-stock company "Ukrutylzbir" was established. It was one of the main suppliers of bones, rags, and waste paper for state enterprises. However, as a non-state entity created by humanitarian organizations – the Ukrainian branch of the Red Cross Society, the Central Commission for Aid to Children under the All-Ukrainian Central Executive Committee, and the Committee for Aid to Sick and Wounded Red Army Soldiers (Perga(B) 2024) – its goal was to generate profits to support its primary activities. Lacking state support, the company had to secure bank credit to fund its waste collection operations, which limited its ability to cover the entire market.

Consequently, a wide range of actors were involved in waste collection. The primary actors were powerful state and non-state entities. These included Derzhtorg (state trade organisation), responsible for export-import operations, including the sale of rags and bones abroad, which began in the late 1920s. Another key actor was the Russian-Austrian Trading and Industrial Joint-Stock Company "Rusavstorg" (1923–1928), which collected in Ukraine agricultural products, as well as rags and bones. In addition to these main market players, lower-tier cooperatives – represented by the Vukoopspilka and Dobrobut societies – unemployed brigades, private entrepreneurs, and individual subcontractors were drawn into this network of collection.

Some private entrepreneurs during the NEP period engaged in this activity as a form of "personal trade," for which they purchased the appropriate patents. The importance of bones and rags for Soviet industry is illustrated by the fact that collectors were granted tax concessions on the industrial tax (according to decrees issued in 1925 and 1928) (Minc 1930: 11).

The bone collection system functioned as a multi-tiered mechanism with complex subcontracting networks. To meet quotas, the main market actors concluded contracts with "second-tier" intermediaries, and in cases of raw material shortages, they could purchase the necessary batches from other companies. This created a situation in which they simultaneously acted as both partners and competitors.

A distinctive feature of the 1920s was that, given the strategic importance of waste for state industry – especially during the industrialization – the main authority responsible for recycling, the People's Commissariat of Trade of the Ukrainian SSR (NKTorg), sought to implement a planned approach in the waste market. Accordingly, all market actors supplying state industry, whether directly or through intermediaries, were obliged to follow these plans. This demonstrates that, despite the partial restoration of capitalist relations during the NEP and the formal existence of a waste market, it was highly distorted and acquired specific characteristics due to attempts to integrate elements of a planned economy into the collection and use of waste. Incompatible management methods caused market chaos and competition for resources, which NKTorg often struggled to control, frequently having to manage the process manually to fulfil the quotas it received from Moscow.

Plans for bone collection in the republics were economically unjustified, as they primarily reflected the ambitions of Soviet leaders. They constantly increasing and did not take into account the economic capacity of the republics to meet them. For example, in 1928 Ukraine was expected to procure around 15,000 tons of bones for state industry, while by 1931 the target had risen to 45,000 tons, equivalent to about 25% of the all-Union plan (203,000 tons) (Spravochnik po util'syr'ju: 45). Additionally, the Soviet style of recycling management involved periodic unplanned increases in targets and the imposition of additional quotas, which further exacerbated the situation. The Soviet central authorities sought to extract all possible waste resources, including bones, from Ukraine and other republics. Regardless of whether they were directed to republican or all-union enterprises, ultimately these resources served to support the existing regime, reflecting the Soviet principle of the 'common pot,' where all contributions from the republics were pooled to serve the needs of the state as a whole and its political regime.

In addition, beginning in the late 1920s, bone exports from the USSR commenced (from Ukraine in 1930, with a shipment of 4,568 tons) (TsDAVO F. 4137, Op.1. Spr. 1467. Ark.17), driven by the need for foreign currency to purchase machinery and equipment required for industrialization. This increased pressure on the market and accelerated the demand for bones.

5. Organization of bone collection in different spaces

The USSR inherited the main spaces for bone collection from the Russian Empire, which were divided into rural and urban areas. In the 19th and early 20th centuries, the peculiarity of urban spaces was that buying and selling operations did not take place at the sites of "bone production" – slaughterhouses – but at locations where meat was consumed. The main sources of bone accumulation in cities included: 1) barracks, hospitals, alms-houses, shelters, boarding schools, and other public institutions; 2) kitchens of public catering establishments and various canteens; 3) canning factories, goose processing plants, and sausage workshops; 4) butcher shops and small retail stores; 5) private kitchens in households; 6) private yards, cesspools, and municipal landfills; 7) so-called "Tatar slaughterhouses" – services that removed urban carcasses and slaughtered horses and dogs; 8) in summer, construction and earthworks in cities (e.g., laying foundations or building underground facilities),

where large buried bone accumulations were sometimes discovered (Obshhestvo kosteobzhigatel'nyh zavdov 1898: 23).

Compared to the Russian Empire, the spaces for bone collection underwent substantial transformation in the USSR. Traditional sources, such as the "Tatar slaughterhouses" and certain public catering establishments, gradually lost their importance, while industrial factories and municipal kitchens increasingly became central to the flow of bones. At the same time, new collection sites emerged, reflecting the shifting socio-economic realities. Industrialization, which demanded a large workforce for factories and enterprises, accelerated urbanization and led to the development of numerous residential cooperatives in the cities – locations that soon became key targets for bone collectors. The role of building management offices also grew, as Soviet authorities sought to obligate them to collect waste, including bones, from tenants. These residential sites were considered promising sources for bulk bone supplies, and pressure on them began in the late 1920s.

The primary method for collecting waste, including bones, was the installation of special boxes. However, residential cooperatives, like public canteens, long refused to do this at their own expense, citing a lack of building materials and funds for their construction. Nevertheless, the People's Commissariat for Supplies of the Ukrainian SSR, by directive, assigned the task of equipping these collection points to the cooperatives and obliged them: "as part of mobilizing internal resources, ensure, at your own expense, the storage of bones until they are collected by the procurers". It further warned that "after receiving this directive, no claims regarding the absence of boxes will be accepted by us". (TsDAVO F.2347, op.1. Spr.24. S.32). Additionally, workers' barracks were also involved in the collection system. This occurred despite the fact that meet consumption during the first 5-year plan was extremely low. For example, an analysis of urban waste conducted in Kharkiv in 1930 revealed the following composition: ash – 32.5%, other inorganic materials – 8.5%, paper waste – 6.7%, coal residues – 2.4%, slag – 2%, wood – 1.6%, textiles – 1.4%, food waste – 1.3%, bones and metals – 0.5% each, and other waste – 0.1% (Mamkov 1941: 16–25).

A key factor contributing to the decline in bones entering the waste stream was the introduction of the food rationing card system (1928–1935). The system limited meat consumption, which in turn reduced the number of bones available for collection. This was not taken in account by waste-collectors. In 1933, the average worker in the USSR consumed 1.113 kg of meat per month, of which 463 g came from public catering establishments. A typical factory-worker family in the Donbas consumed 1.227 kg of meat in 1932 (of which 1.047 kg was for home consumption) and 1.196 kg in 1933 (732 g for home consumption) (Bjudzhety fabrichno-zavodskih rabochih SSSR). Members of other social groups had lower rations, and some – for example, those deprived of voting rights – did not receive ration cards at all and were forced to purchase food on the black market, where prices were several times higher.

Despite these circumstances, the range of public catering facilities involved in bone collection was expanded to include canteens of social infrastructure institutions – such as holiday homes and orphanages, sanatoriums, public schools, kindergartens, and residences for people with disabilities. The main collectors also concluded a series of agreements with the Military Department for the wholesale supply of bones from the dining facilities of military units. In the cities, a waste recycling infrastructure was established, with warehouses and collection points where the population could personally deliver their waste. Special agents worked with large-scale waste producers. In rural areas waste collecting points were established one for 50 kilometres.

The collection process had changed little since the Russian Empire. The typical Soviet waste collector, representing the collection organizations, resembled a ragpicker from the 1890s:

"A ragpicker, who has gathered crosses, beads, silk hair ribbons, handheld mirrors, fragrant Kazan soap, and other small haberdashery items into a box, sets out to travel through the countryside. He aims to reach the most remote corners, where homes use more locally produced linen fabrics. Upon arriving in a village, he stops in the middle of the street and opens his little shop, which fits entirely inside a box placed on a cart… For peasant children, he carries gingerbread, bagels, and sweets…" (Bahtijarov 1890). In other words, Soviet collectors adopted the main "capitalist" method of operation – exchanging waste for goods scarce in the rural hinterlands. The only noticeable change was in their assortment: crosses disappeared, while red ribbons, fabric, and notebooks appeared (TsDAVO F. 4137, Op.1. Spr. 55. Ark.7).

An algorithm for the advertising campaign was developed for both urban and rural areas. It involved printing leaflets and posters to be displayed in peasants' homes, village councils, reading rooms, tea houses, post offices, and at the entrances to settlements. Additionally, public collectors were required to carry a price list for purchasing waste and present it upon the population's first request (TsDAVO F. 572, Op.1. Spr. 903. Ark.42).

Only by the late 1920s did the principles of bone collection in the Soviet Union begin to change. Under industrialization, waste was increasingly seen not as a by-product but as a strategic raw material requiring centralization and state control. NKTorg decreed that all state and cooperative enterprises in the livestock-slaughtering, meat-canning, and sausage industries, as well as public catering facilities

and military units, were obliged to transfer bones to local procurement organizations at prices set by the authorities. This established a centralized system for bulk collection, separating the process from small private or incidental sources and emphasizing the planned nature of the Soviet waste collection system. To expand this activity, NKTorg initiated the creation of specialized bone-collection associations, including collectives of unemployed people, disabled artels, and itinerant collector agents (Minc 1930:8). The work involved the Komsomol, school organizations and Pioneer detachments, committees of poor peasants (Komnezemy), mutual aid committees, the Ukrainian Red Cross, the "Dopomoga" society, and women's organizations (TsDAVO F. 2923, Op.1. Spr. 74. Ark.380). During this period, new methods of waste collection were also introduced, including mobilizing broad segments of the population (as a social obligation), such as schoolchildren, and using administrative resources in the form of mandatory decrees issued by local executive authorities, and in some cases, directly by NKTorg.

6. Partners vs competitors?

Both the shortage of bones and the imperfect organization of their collection led to fierce competition among all market participants. It was therefore common practice to violate the conventional prices set by NKTorg for bones and to pay rural collectors increased advances, which they used to purchase waste from the population while keeping a commission for themselves. For example, in 1928, Commercial Director of Ukrutilzbir Horatsii Volodarskyi wrote a complaint to the Superphosphate Combinate regarding its agent in Bila Tserkva, I. Stavinsky:

"We have received a report from our Bila Tserkva warehouse that, in order to increase his procurement, he is paying prices above the limits and thus slowing down the collection of bones, because the collectors wait for a third party to come and offer an even higher price, refraining from turning in bones" (TsDAVO F. 2923, Op.1. Spr. 74. Ark.380).

Similar cases were frequent among all major procurers, and some situations could not be resolved without the intervention of NKTorg. In our view, such methods of unfair business practice were driven by the need to meet quotas, which were often impossible to achieve without such tactics. These practices disorganized the market, drove up the price of bones, and created obstacles to fulfilling the plans.

Furthermore, during the NEP period, key state procurers competeв also with private entrepreneurs. In the 1920s, while state structures were still establishing systems for collecting waste, commercial operators sought to dominate the market. Many of these entrepreneurs had prior experience in similar activities, a well-established network of suppliers, collectors, and buyers, as well as their own infrastructure and logistics. They were more mobile and capable of procuring large batches of bones, creating significant competition for the main state procurers.

The latter tried to leverage administrative resources in this struggle, using directives from responsible agencies or local authorities. In a 1927 letter, the Commissioner of the Superphosphate Plant, Hermanovsky, described competition with private individuals as follows:

"We requested the issuance of a corresponding order – to publish in the local press of Vinnytsia the decree of Narkomtorg stating that all state and cooperative organizations involved in the sale of bones must submit them exclusively to the Superphosphate Combinate at the convention prices. However, no such order was issued. Nevertheless, the mentioned state cooperative organizations, despite the cited decree of NKTorg of the Ukrainian SSR, are selling bones to whomever they wish, including private individuals".

He requested that the department of Derzhtorg – Okrtorg immediately issue a categorical directive requiring the 1st Sausage Factory for People with Disabilities to continue delivering bones to the plant at the established convention prices, as had been done previously, rather than to the private citizen Rekedi, who continuously attempted to conclude a contract with the plant that was disadvantageous to the state. The Commissioner described the mechanism of pressure applied by the private entrepreneur Rekedi on the Superphosphate combinate as follows: "*He decided, by any means, to take bones from the best state cooperative sausage factories, thereby forcing us to face the fact (as he put it) of the need to conclude a contract with him*" (TsDAVO F. 2923, Op.1. Spr. 54. Ark.85).

Citizen Rekedi was not the only one causing problems for the Superphosphate combinate. A dispute with Citizen Levenshtein was even discussed at a meeting of the Raw Materials Department of Narkomtorg in April 1927. Being one of the suppliers of sugar grits to state and cooperative organizations, he secured extremely favorable terms from NKTorg for supplying bones to the plant. He was allowed to procure them at the convention prices set by this regulatory body for the main procurers – legal entities – at 40 kopecks per pood. Moreover, he accounted for 25% of all monthly bone procurement in Kyiv.

Levenshtein's final cost of the collected bones was lower than that of the Superphosphate combinate because it included only the convention price per pood of bones and the wages he paid his workers. Meanwhile, the plant's cost calculation included, in addition to the above, overhead expenses for salaries, railcar freight, loading and unloading, and veterinary inspections, placing it at a disadvantage. The plant's director, Hermanovsky, demanded that Levenshtein be required to pay the same overhead costs and supply

bones not to northern factories located in the RSFSR, but to the Superphosphate Plant's facilities in Ukraine, in accordance with the bone procurement regulations of January 6, 1927. He wrote:

"Only under these conditions will Levenshtein be on equal terms (not better) than the Superpphosphate combinate and will not be able to compete with the price of his grits. Otherwise, our plant will lose orders from state industries and be forced into inactivity" (TsDAVO F. 2923, Op.1. Spr. 54. Ark.85).

7. Problems of bone collecting

Apart from those mentioned above, bone collection faced a number of other problems. First and foremost was the very low purchase price offered to the population – a centner (100 kg) cost, depending on its grade, between 2.5 and 4.5 rubbles (2.5 – 4.5 kopecks per kilogram) which was roughly half the production cost of 9 rubles (Spravochnik po util'syr'ju. Oficial'noe izdanie 1931: 41). Despite all efforts to reduce costs, this was hardly achievable. Documents from Vukpromspilka indicate that the production cost of bones intended for export was 76.5 kopecks per ton (TsDAVO F. 4137, Op.1. Spr. 1467. Ark.17) significantly higher than the price at which they were sold on foreign markets.

However, the greatest challenge was the wide dispersion of collection points in rural areas, which meant that forming a single batch required traveling across large territories. Motorized transport was extremely limited at this time – it began to be used only in the early 1930s, and then only in exceptional cases during large-scale mobilization campaigns in the countryside and cities, such as *subotniks*. As a result, in rural areas, waste was collected using horse-drawn carts. Yet, the cost of fodder was very high. Moreover, due to a shortage of railcars, the railway allowed cargo to be transported only in minimum weights of 10 tons, which further increased logistics costs.

NKTorg issued a circular titled "On the Concentration of Bones Stored by Individual Collectors", recommending that small-scale agents cooperate with large procurement companies and use their warehouses to assemble large batches (Minc 1930: 15). This pushed small-scale collectors out of the market, as using the warehouses of major companies for batch formation entailed additional costs for rent and logistics, significantly increasing the production cost of their operations. This worsened the situation, as the number of people willing to engage in such arduous and low-profit work continued to decline.

One more problem was that rural cooperative employees, tasked with collecting waste in the countryside, had little interest in this work. They were already overburdened with the procurement of agricultural products, which allowed them to meet their quotas without difficulty. Collecting rags and bones required considerable effort, traveling to many remote areas, and motivating peasants, who often demanded scarce haberdashery goods that the procurement companies had in limited supply or not at all. Moreover, for an extended period, they followed a single collection plan that combined waste and agricultural products, which could easily be fulfilled primarily through the latter.

These organizational difficulties complicated the collection of bones, while broader economic and demographic changes only deepened the crisis. Between 1928 and 1934, during the collectivisation and Holodomor livestock numbers in Ukraine declined sharply: horses by 54%, cattle by 46%, cows by 37%, and pigs by 37% (Sel'skoe xozyajstvo SSSR 1936: 525). During collectivization, Ukrainian peasants who did not want to join collective farms (kolkhozes) and socialize their property and cattle began to slaughter their livestock. the Holodomor in 1932–1933, peasants not only milked the remaining livestock but also consumed various waste products, including the bones of dead animals. Over the 11 months of 1932, the bone collection and shipment plan were fulfilled at only 61% (TsDAVO F. 572, Op.1. Spr. 903. Ark.42). By May 10, 1933, this figure had dropped to 44.1% (TsDAVO F. 2347, Op.1. Spr. 22. Ark.41). The "bone" crisis forced the Council of Labor and Defence in 1932 to reduce the USSR's bone collection plan to 150,000 tons (TsDAVO F. 572, Op.1. Spr. 903. Ark.42).

Some representatives of the procurement organizations acknowledged the severity of problems in waste collection, particularly regarding bones. A representative of Vukoopsyrovyna wrote about the "extremely dire situation in which procurement found itself in 1932," noting that social changes, collectivization, and the consolidation of peasants into kolkhozes were not taken into account (TsDAVO F. 4137, Op.1. Spr. 80. Ark. 21). It is also necessary to take into account the facts revealed by Ukrainian researcher Natalia Kuzova that during the Holodomor, instead of being processed, bones were centrally transferred, by decision of local authorities, to supply workers' canteens (Kuzova 2023: 171).

However, the Soviet party and regulatory authorities were unwilling to recognize the systemic nature of the problems hindering the fulfilment of bone collection plans – such as the deficit economy and food crisis, the consequences of collectivization and the Holodomor, and the low purchase price that made operations unprofitable and undermined any motivation for both the population and collectors. Instead, the main causes of the bone procurement crisis were attributed to the poor performance of the collectors and local organizations, who "pass by the bones… [they] are indifferent to procurement. They lack the necessary persistence in collecting" – as wrote the director of one factory to the Vukoopspilka, with a copy sent to Chemical Trust (TsDAVO F. 4137, Op.1. Spr. 35. Ark.231).

Archival documents frequently record complaints from the Superphosphate combinate about the failure to meet bone collection targets. Letters and telegrams to the collectors, such as this one: "Bone deliveries are limited. Take urgent measures to accelerate procurement" (March 22, 1928), were a common occurrence (TsDAVO F. 4137, Op.1. Spr. 80. Ark.21). One more example: in 1928, representative of this enterprise wrote to Vukoopspilka "*Every year in Ukraine more than 2 million poods of various bones are obtained, which could be processed into superphosphate, bone charcoal, and other products. However, this year we have procured only 1 million poods of bones through the main collection agencies*". He tried to explain to the People's Commissariat of Trade the detrimental effects of low procurement prices; however, his arguments for the necessity of raising them were not taken into account (F. 423, Op.4. Spr. 318. Ark.6).

In addition to the organizational problems mentioned, in the early 1930s the USSR – and Ukraine in particular – underwent a reform of the procurement system. As a result, Ukrutil, a newly established structure under the People's Commissariat of Light Industry of Ukraine, was unable to establish a systematic operation with the collectors in a timely manner. This was further complicated by the low value of bones, insufficient allocation of funds to procurement points for purchasing bones from the population, and delays in payments by bone-processing plants for the received materials.

Deputy Head of Ukrutil Miron Kolchynskyi, explained the situation on the market this way:

"*The bone market is in complete disarray, and everyone acts in their own interest… "Ukrtekhzhyrtrest… decided to switch to self-procurement to ensure uninterrupted bone supply and signed an agreement with Zagotexport. In the Odessa region, it burned bones manually… even though the quality of the final product was low. Vukoopsyrovyna shipped… bones to Moscow. Zagotshkira sold bones… to cooperatives and refused to sign agreements to deliver them to industry at fixed prices. The People's Commissariat of Light Industry of Ukraine, although aware of the situation, could not manage it and did not take decisive measures to 'stop this disorder currently existing in the procurement market for bones*" (F. 572, Op.1. Spr. 903. Ark.42).

Thus, by the early 1930s, the situation had changed little since the early 1920s, and newspaper correspondents described the bone collection process as follows: "*According to local reports, there are cases where this valuable by-product is not collected in time, rots, creates unsanitary conditions in the surrounding area, and ultimately ends up in landfills, while the bone-processing industry faces the threat of shutting down certain factories that primarily operate for export due to a shortage of raw materials"*. (Pro "baraxlo i traktory" 1930: 13).

8. Conclusions

The collection of bones in early Soviet Ukraine illustrates on a small scale the entire process of waste collection in the 1920s and early 1930s, during the formation of state policy in this sphere. This case allows us to draw several key conclusions.

First, resource extraction practices typical of colonial economies, applied to peripheral republics, began to take shape in the USSR as early as the 1920s. For example, in addition to 25% of bones from the all-Union plan, Ukraine in 1931 was required to collect 16% of the all-Union paper recycling plan, 43% of scrap ferrous metals, 29% of non-ferrous metals, and 19% of rags (Spravochnik po util'syr'ju 1931). Waste was treated as a resource on par with Ukrainian grain, forests, coal, gas, and water, supporting the economic needs of the Soviet totalitarian regime, regardless of the waste's destination or subordination.

The Soviet Union did not invent the "wheel": waste collection practices in the 1920s showed continuity with the Russian Empire, where rural populations were motivated with scarce goods. Almost all traditional collection sites from the Russian Empire were used. Only with the onset of Soviet modernization and industrialization did new approaches to waste collection emerge, reflecting accelerated urbanization, industrialization, and social-economic transformation, which also created new collection spaces.

The administrative model of waste recycling, including bones, demonstrates the Soviet authorities' desire, even during the NEP period, to control resource flows through elements of a planned economy. Despite market decentralization and the presence of both state and private collectors, regulatory bodies sought to establish a management vertical where all participants worked to fulfill the objectives of Soviet power.

Incompatible approaches, organizational difficulties, imbalances between collection costs and purchase prices, and low motivation among workers and the population created numerous problems and led to plan failures, even in regions or periods when bones were available in sufficient quantities. NKTorg could not radically influence the situation, as the problems were systemic, and it effectively managed the market "manually," applying a strategy of controlled chaos. In these conditions, major collectors had an ambivalent status, simultaneously acting as partners and competitors.

The efficiency of recycling in early Soviet Ukraine remained questionable: the system was often unprofitable and did not ensure optimal resource use. At the same time, it fulfilled an important political function which compensated this – subordinating the economy to the central directives and demonstrating the Soviet system's ability to mobilize peripheral resources. During this period, the perception of waste as valuable

raw material was formed, the necessary infrastructure was created, collection methods were developed, and a group of specialists trained within the Soviet system emerged.

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