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DISTRIBUTION OF THE MANUFACTURED AGRICULTURAL PRODUCTS IN ASPECT OF THE WORLD POPULATION NUTRITION

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DISTRIBUTION OF THE MANUFACTURED AGRICULTURAL PRODUCTS IN ASPECT OF THE WORLD POPULATION NUTRITION

DYSTRYBUCJA PRODUKOWANYCH ARTYKUŁÓW ROLNYCH W ASPEKCIE WYŻYWIENIA LUDNOŚCI ŚWIATA

Summary: *In the present paper, the world food situation, with the particular consideration of production of cereals, sunflower, corn(maize), rape and soya has been presented. The mentioned above products have the greatest impact on the nutrition of the world population. It has occurred that Ukraine has a considerable effect on food ensuring what is aimed at avoiding the occurrence of the nutrition problems in many countries in different world parts. The discussed situation was revealed after the outbreak of the war in Ukraine. About 20 million tons of Ukrainian cereals, as being stored in harbours of Ukraine have been blocked against the possibility of sale to the customers in different countries of the world where – in the case of lack of the mentioned product – the phenomenon of hunger is expected. Ukraine is the leading producer of rape and sunflower oil.*

Keywords: *food safety, world nutrition, cereal production, sunflower production, Ukraine, supply of cereals*

Streszczenie: *W artykule przedstawiono światową sytuację żywnościową, ze szczególnym uwzględnieniem produkcji zbóż, słonecznika, kukurydzy, rzepaku oraz soi. Produkty te mają największy wpływ na wyżywienie ludności świata. Okazuje się, że Ukraina ma znaczący wpływ na zabespieczenie żywności dla uniknięcia wystąpienia problemów wyżywienia wielu krajów w różnych regionach świata. Sytuacja ta wyraźnie wyszła na jaw po wybuchu wojny na Ukrainie. Około 20 milionów Ukraińskiego zboża składowanego w portach Ukrainy zostało zablokowane przed możliwością sprzedaży do odbiorców w różnych krajach świata, gdzie w razie braku tego zbaża wystąpi zjawisko głodu. Ukraina jest czołowym producentem rzepaku oraz oleju słonecznikowego.*

Słowa kluczowe: *bezpieczeństwo żywnościowe, wyżywienie świata, produkcja zbóż, produkcja słonecznika, Ukraina, dostawa zbóż*

Introduction

Cereal production belongs to the most important branches of total agricultural production. Cereals – as being known for the centuries – have been cultivated all over the world. They constitute a basis for food supply for the considerable population of the world. The failure in the cereal crops would mean the failure of food, hunger. Therefore, the cereal market is precisely analysed and the stocks are built. The cereals are one of the most valuable raw materials all over the world. The present article contains the general data which may illustrate, in the best way, the mean production over the years. Cereal production is not constant and it is dependent on atmospheric and economic conditions.

If we wanted to develop a production coefficient according to the area of the country, Poland would be found, in majority of the data, in the close leading group, although as it is, we are now in the first "10" or immediately after it in all important rankings of cereal production. When taking into consideration only the European Union, we may notice that the greatest production in the EU agriculture comes from Germany, France and Poland. Certain statements include also Spain or Italy. When speaking about the while Europe, we have also mention Russia, Ukraine, Belarus and Turkey.

Poland is the important agricultural producer although due to the area of the cultivated land, we cannot keep up with Russia, China or the USA.

The main cereal producers at the world markets outside Europe are China, India, Pakistan, The United States of America, Canada, Australia and Egypt, Argentina and Brazil. The last three countries did not appear in the mentioned data; nevertheless, they are the leaders at their continents and also belong to the major participants of the world cereal production market.

We should remember that other cultivated plant crops are also important for the world production of food. Rice is the fundamental product in China or in India – the sates which are inhabited by ca 2.7 billion people. Sugar, which is produced from sugar cane or from beetroots, plays a significant role at the world markets. The same concerns sorgo in African countries.

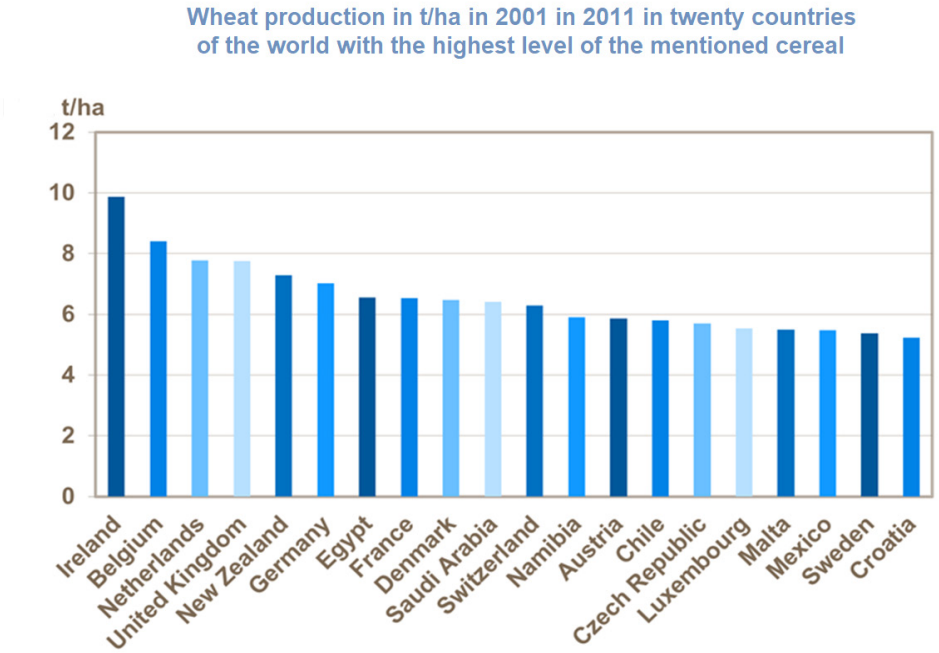

Fig. 1. Wheat yields (t/ha) obtained in twenty countries of the world with the highest production of the discussed grain (2011)
Source: Faostats

China is the greatest cereal producer globally all over the world. It produces 612 170 193 tons annually. The USA are found at the second place with the annual production of 467 951 140 tons. India occupies the third place and its annual cereal production is equal to 318 320 00 tons.

France is the greatest producer of cereal grain in the EU – its production amounts to 67.3 million tons what constitutes 22% of the total EU production. Germany has produced 47.8 million tons of grain what is the 16-% participation in the EU production.

Poland occupies the third place in the mentioned ranking with production of 28.5 million tons, what makes the 9% participation in the EU. Spain is immediately after Poland and its production is equal to 25.4 million tons of cereals.

Wheat production in t/ha in 2001 in 2011 in twenty countries of the world with the highest level of the mentioned cereal is given in Fig.1.

The global wheat yields are very much differentiated between the particular Continents. A moderate climate of the central and north Europe creates the conditions favourable for obtaining very high crops, with the simultaneous occurrence of extreme conditions such as draught and frost. The range of the crops all over the world amounts from 9.86 t/ha in Ireland to 0.31 t/ha in Venezuela. The current world record in respect of the harvested crop was reached in New Zealand in March 2020 – 17.389 t/ha. The present problem concerns the level of the obtained yields in many countries as nowadays, assurance of the appropriate food quantity in the light of constantly increasing population is a big challenge. To obtain the high cereal crops, it is necessary to employ the modern cultivation technology. It is illustrated in Fig.2.

As it was reported by USDA, the world market of wheat production is dominated by the following countries: EU (150.969 million tons), China (126 million tons); India (95 850 million tons);

Fig. 2. Cereal fungicides ensure the effective cereal disease control and result in crops of a good quality
Source: Faostats

USA (55 238 million tons) and Russia (59 million tons). The Ministry of Agriculture of Russia estimates at present cereal crops at the level of 100 million tons, including 56 million tons of wheat, in spite of the fact that the American forecasts inform about higher quantities (59 million t).

From the top five world producers of wheat, only USA, EU and Russia are the exporters. High crops of low quality wheat have caused a decrease in the grain prices. The increase in the export by 1.0 million tons in the case of Canada, EU and by 0.5 million tons from Brasilia and Kazakhstan due to greater stocks, was recorded.

Based upon the data from the Ministry of Agriculture of Russia, USDA informs that in August, Russia exported a record number i.e. 4.7 million tons of cereals and in the whole cycle 9.9 million tons, including 8.9 million tons of wheat. The Americans anticipate that Russia may reach the historical maximum in 2022

in respect of cereal export and may close the agricultural season with the result of 30 million tons of the exported cereals whereas in the previous year, the mentioned quantity was equal to 26 million tons. The increase in the export of wheat from Russia was affected by a low quality of the cereals at the European and Ukrainian market. In Russia, good results of cereals are expected – until now, 75 million tons have been harvested, it is however possible to reach crops at the level of 104 million tons.

Wheat production in Australia had dropped by 0.5 million tons due to the draught in the greatest producing regions in this country. The successive important changes in the increase of wheat production concern Morocco (0.4 million t) and Algeria (1.0 million t). In Algeria, in spite of the growth in wheat production, the increase of import has been recorded.

According to IGC, wheat prices in Europe are still dropping due to a high production; there is no great demand, therefore, the prices are lower. The international wheat trade has increased because of the increased import by Algeria, Pakistan and Iran.

Distribution of agricultural products at the world markets, including Ukraine

Poland is a meaningful food exporter, including also cereals. In Poland, 28–35 million tons of cereals in total are produced every year. Export is dependent on the situation in a given year, from 4.8 million tons to ca. 9 million tons in the record year 2020. Import accounts for 2–3 million tons. The percentage import of cereals from Ukraine in 2020 by the particular countries of the worlds is given in Fig. 3.

In the opinion of experts, the problem of cereal supplies has been found in the centre of attention on geopolitics after the invasion of Russia on Ukraine. The international data indicate that in 2020, Ukraine was the second (after USA) exporter of cereals in respect of their value. For certain countries of Africa and Asia, Ukraine is the greatest supplier of the discussed products; for Iraq or Lebanon, it is the greatest supplier of vegetal and animal fats.

Table 1 shows the greatest importers of Ukrainian cereals in 2020, in millions of USD.

The President of the leading Ukrainian food enterprise MHP said when talking with "Financial Times" that he was afraid of this year's spring season of seeding which has a key meaning not only for the domestic supplies in Ukraine but also for the great quantities of cereals and vegetal oils intended for export. The mentioned above conflict has a great influence on the capacity of Ukraine and Russia in respect of supplying the world. He added also that the success of the seeding season would be determined by the run of military operations. He warned that it will be endangered if the Russian army will enter the western regions of the country. Ukraine is one of the top producers and exporters of agricultural crops. After the invasion of Russia, the authorities of Ukraine introduced the export restrictions. At present, there is a ban on export of barley, rye, millet and buckwheat and also, sugar, salt and meat in Ukraine. The export authorizations are valid for export of wheat, corn and sunflower oil. According to Food and Agriculture Organization of the United Nations (FAO), due to the war, started by Russia, even 30% of cultivable areas will be not sown this year.

According to the statistics of the International Trade Centre (ICT) for 2020 (the newest data available) China was then the greatest importer of Ukrainian products (all, not only agricultural crops) (All data cited in this paper come from ITC basis). Value of

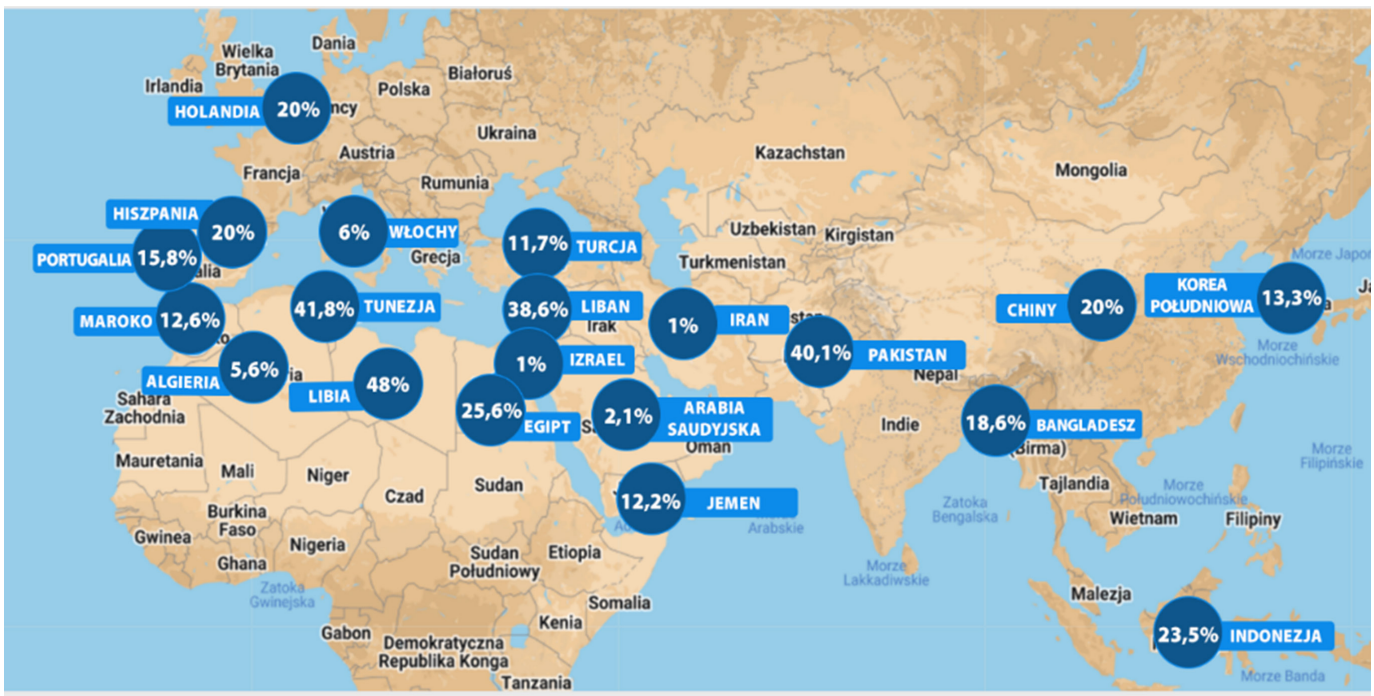

Fig. 3. Percentage of imported cereals in 2020 came from Ukraine (the greatest importers are considered)
Source: ITC/Trade Map

Table 1. The greatest importers of Ukrainian cereals in 2020
Source: ITC/Trade Map

Country	value, in mln USD
China	1855
Egypt	1120
Indonesia	547
Spain	543
the Netherlands	519
Turkey	473
Tunisia	347
Bangladesh	317
South Korea	282
Libya	265
Pakistan	258
Morocco	256
Israel	230
Iran	228
Lebanon	184
Italy	160
Saudi Arabia	155
Algeria	153
Yemen	144
Portugal	130

export from Ukraine to China amounted to 7.1 billion US dollars. Poland was found at the second place – value of the purchased products was equal to 3.4 billion US dollars. The remaining crucial trade partners of Ukraine were: Russia, Turkey, Germany, India, Italy, the Netherlands, Egypt and Belarus.

The role of Ukraine in the world nutrition

Ukraine is one of the world leaders in trade of the following categories of products: cereals, fats and oils of vegetal and animal origin. The cereals sold by Ukraine in 2020 constituted 7.9% of the world export whereas vegetal and animal fats accounted for 5.6% of the mentioned trade. Ukraine is the leader in export of sunflower oil. In 2020, it exported 6.2 million tons of the last mentioned product at value of 4.7 billion dollars. In export of rape, Ukraine occupies the second place in the world ranking. In 2020, its export of rape was equal to 2.4 million tons at the value of more than 1 billion US dollars.

Moreover, Ukraine is the fourth world exporter of corn (maize) – in respect of the quantity as well as price of the exported product. In 2020, Ukraine exported almost 28 million tons of corn at the value of 4.9 billion dollars. It is the fifth world exporter of wheat. In 2020, it exported more than 18 million tons of wheat at the price of 3.6 billion dollars. Ukraine occupies the second place in respect of the quantity and the fourth place in respect of the obtained price of barley. In 2020, the Ukrainian farmers produced more than 5 million tons of barley, sold for the sum of 877 million dollars. Ukraine is the seventh world exporter of soya – export in 2020 amounted to 1.8 million tons and its value was 690 million dollars. Ukraine exported almost 81 thousand tons of honey in 2020, at the price of 139 million dollars what was the second result in the world in respect of the quantity and the fifth place in respect of the obtained price. India is the greatest importer of Ukrainian fats. Value of their sale to the mentioned country exceeded 1.4 billion dollars. China is found at the second place. It bought fats from Ukraine at the value of 1.1 billion dollars. The remaining greatest importers on the discussed category are: the Netherlands (529 million dollars), Spain (342 million dollars), Iraq (325 million dollars) and also, Italy, Poland, France, Great Britain and Egypt.

The war in the Ukraine may deepen a crisis at the global food market. In the media of the whole world, we may find more and more frequent alarming comments of economists and experts dealing with agriculture that invasion of Russian in Ukraine may have severe consequences in the countries situated thousands of kilometres from the war zone. Wheat and other cereals have again been found at the centre of attention of geopolitics after the invasion of Russia in Ukraine. Since 2020, the prices of cereals and oil plants all over the world have increased what was one of the main factors, causing a general increase in the food prices. It results, first of all, from dry weather conditions in the South America and Indonesia which caused poor crops, and from the increasing demand on cereal food products in China and India. Just before the invasion in Ukraine, as compared to the analogical period of 2021, the prices of the products were already increased: corn – by 21%, wheat – by 35%, soya – by 20% and sunflower oil – by 11%. It caused that the prices in 2021 were very high. The food crisis, caused by the Russian invasion may occur to be greater problem for the world the crisis at the energy market. In the rich regions – such as the Northern America and Europe – the rises of the prices will be painful but in the most cases bearable. It may be so because the consumers in the developed countries do not spend a prevailing part of their incomes for food. In the poorer countries where the expenditure for food is the enormous part of the family budget, so the shock connected with it may be more serious.

Since the outbreak of the war in Ukraine, the efforts of the EU, including Poland are undertaken in favour of increasing the capacity of land transport of, *inter alia*, cereals from Ukraine. The mentioned activity is indispensable in order to help Ukraine. The discussed transport is performed, inter alia, via territory of Poland.

Recently, the Ministry of Agriculture and Rural Development has observed the increased import of cereals from Ukraine, in particular of corn (maize).

According to the data of the State Treasure Administration (in Polish: KAS), since February 24 until June 6, the following products were, *inter alia*, imported to Poland:

- 520 thousand tons of maize from Ukraine, in comparison to ca. 1 thousand tons in analogical period of 2021;
- 528 tons of wheat as compared to ca. 1.4 thousand tons in the analogical period of 2021.

A considerable increase of cereal transit via Poland from Ukraine has been also recorded. The data of KAS state that the transit transport from the beginning of the war until 15 May of the present year was as follows:

- 421 thousand tons of corn (increase of transit by 44776% in realtion to the analogical period of 2021;
- 52.3 thousand tons of soya (increase by 6159%);
- 4.9 thousand tons of sunflower (increase by 2496%);
- 396 tons of wheat (decline by 68%).

Table 2 contains the greatest trade partners of Ukraine in respect of all products, being the object of exchange; value of export is given in USD.

Table 2. Trade partners of Ukraine, value of export is given in US dollars
Source: ITC/Trade Map

Country	value, in US dollars
China	7107
Poland	3443
Russia	2707
Turkey	2416
Germany	2097
India	1972
Italy	1931
the Netherlands	1813
Egypt	1618
Belarus	1339
Hungary	1259
Spain	1253
Romania	1087
United States	982
The Czech Republic	823
Indonesia	734
Saudi Arabia	719
Moldova	682
Great Britain	668
France	602

Summing up

We may expect the following situation which may happen in the regions adjacent to Ukraine:

- decrease of demand of the cereals-purchasing entities, due to, *inter alia*, the storage situation and the need to prepare to the purchase of cereals from this year's harvest;
- inflow of the cereals from Ukraine may contribute to the increase of production at the market and supply at the market and decline of prices;
- unstable run of purchase of Polish cereal grain;
- receipt and issuance of not every amount of domestic cereal;
- increase of purchasing activity at the local markets.

The complete unblocking of 20 tons of cereals stored at Ukrainian harbours is a necessity. It must be transported by sea and land to the users in different countries of the world as they need this product very much.

The entities which deal with the purchase of cereals are preparing to the new season of harvesting and the state of storehouses in certain collecting sites is equal to a half of their capacity.

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ROAD TRAFFIC PROTECTION IN POLAND

OCHRONA RUCHU DROGOWEGO W POLSCE

***Summary**: Road traffic safety is all about the ability of a human-vehicle-road system to have collision-free functioning, and a separate discipline dealing with the organisation and monitoring of road traffic. The level of road safety is measured by the number of traffic incidents. These incidents can involve a single vehicle, or traffic collisions resulting in damage to property, or traffic accidents with fatalities. The favourable geographical location of Poland, coupled with the widespread availability of storage space, generates heavy traffic. As a result, there are many domestic and transit carriers, as well as private, vehicle road users. Regardless of the efforts of the Polish government aimed at improving safety standards and road traffic, many road accidents still occur, which negatively impact on the attractiveness of the country and generate great costs. Social campaigns concerning the consequences of traffic incidents launched in the media are slowly beginning to yield the desired results. Nonetheless, investment in equipment ensuring road safety and systems improving road traffic on European roads appears to be a more effective way of improving the standards of Polish roads. The paper, based on available literature on the subject, addresses the measures which are undertaken in the field of road infrastructure and which contribute to road traffic safety.*

***Keywords**: transport, car, road, safety measures, road traffic*

***Streszczenie**: Bezpieczeństwo ruchu drogowego to przede wszystkim bezkolizyjne funkcjonowanie układu człowiek-pojazd-droga oraz odrębna dyscyplina zajmująca się organizacją i monitorowaniem ruchu drogowego. Poziom bezpieczeństwa ruchu drogowego mierzony jest liczbą zdarzeń drogowych. Zdarzenia te mogą dotyczyć pojedynczego pojazdu lub kolizji drogowych skutkujących uszkodzeniem mienia lub wypadków drogowych z ofiarami śmiertelnymi. Korzystne położenie geograficzne Polski w połączeniu z powszechną dostępnością powierzchni magazynowych generuje duży ruch. W efekcie istnieje wielu przewoźników krajowych i tranzytowych, a także prywatnych użytkowników dróg samochodowych. Mimo wysiłków polskiego rządu zmierzających do poprawy standardów bezpieczeństwa i ruchu drogowego, wciąż dochodzi do wielu wypadków drogowych, które negatywnie wpływają na atrakcyjność kraju i generują ogromne koszty. Rozpoczęte w mediach kampanie społeczne dotyczące skutków zdarzeń drogowych powoli zaczynają przynosić pożądane rezultaty. Niemniej inwestycje w urządzenia zapewniające bezpieczeństwo ruchu drogowego i systemy poprawiające ruch drogowy na europejskich drogach wydają się być skuteczniejszym sposobem na poprawę standardów polskich dróg. Artykuł, oparty na dostępnej literaturze przedmiotu, dotyczy działań podejmowanych w zakresie infrastruktury drogowej, które przyczyniają się do bezpieczeństwa ruchu drogowego.*

***Słowa kluczowe**: transport, samochód, droga, środki bezpieczeństwa, ruch drogowy*

Introduction

Over the recent years, we have observed a rapid increase in the number of road users and, consequently, in the proportional growth of traffic volume. This translates into more accidents, the vast majority of which was caused by the improper and insufficient road infrastructure. Systems supporting safe journeys, although simple, are based on a number of algorithms which are used for collecting, analysing and transferring data. Among other things, Road Traffic Safety devices (RTS) are used with a view to making roads safer. Their task is to carry out optics-based management of road traffic (the systems notify of bad weather conditions, and drivers can read the notices, generated real-time, on electronic display boards placed along numerous routes), mark any objects on the edge of the road and secure vehicle and pedestrian traffic. The safety of drivers, pedestrians and cyclists is also improved by appropriate lighting of the road and the surrounding areas. Transport is responsible for 29 % of CO_2 emission; this is the reason why cities with substantial traffic congestion are no longer attractive places to live and work in.

Road transport safety programmes

Analysis is the main source for creating action plans, and the priority is protecting the lives and health of road traffic participants. Most road accidents result from errors made by road users, despite good road conditions. Road factors account for only 2–4% of the incidents. Detailed research results show that improper road infrastructure indirectly and directly contributes to approximately 30 % of accidents, with around 70.9 % of the events taking place in built-up areas.

Road safety devices can be divided into four categories. The first category includes road traffic safety signalling equipment which is used for providing information to drivers and other road users in the form of prohibition, mandatory and warning signs, and any other information on road traffic. The second category comprises protection devices, used in order to prevent accidents or minimise their outcomes. The next category includes anti-destructive equipment, aimed at mitigating the outcomes of an accident or, to a smaller extent, reducing the risk of the incidents (e.g. speed bumps). The task of equipment included in the last category is to counteract breaches and ensure smooth traffic

flow and order. The devices used in high-risk areas include equipment restraining vehicle traffic, inter alia, traffic barriers, together with transitions, barrier terminals, initial sections, and crash cushions. Devices restraining pedestrian traffic include safety barriers and pedestrian safety fences. In terms of the produced effects, RTS devices can be divided into active and passive. Passive devices do not come in the direct contact with vehicles during impact, an accident or a collision. Their task is to organise and control road traffic, provide information on potential threats and dangerous spots. Road signs, light signal devices and anti-glare screen systems are also classified in this category. On the other hand, active road traffic safety devices include those devices which come in direct contact with vehicles during an accident or collision – traffic barriers, bridge rails, energy-absorbing barriers – referred to as safety design structures, adjusted to withstand a potential contact with vehicles.

Traffic barriers

Traffic barriers are designed in such a way as to mitigate the outcomes of being forced into driving off a lane or the road crown, protect the vehicle from hitting a permanent obstacle within the road crown, and protect the vehicle from being directed into an opposite lane. Barrier functions have a significant impact on the safety, as over 15% of passenger cars going out of the road lane hit the protective barriers. The impact angle usually does not exceed 10 degrees [6].

Depending on the material used, barriers can be divided into steel, concrete, aluminium or cable barriers. Safety barriers, which are properly used, should create a mutually complementary system. Modern concrete barriers make a complex of interconnected segments. Individual segments are rigid but their connection is a joint of a limited mobility. In Poland, full concrete barriers with "F" type side wall profile have been introduced. They are safer for passenger cars than New Jersey profile used in some other countries [7].

Signage

RTS devices, which include road signs, are aimed at providing specific information in a manner understandable to every traffic participant. They can assume the form of a plate or a board. Their task is also to warn traffic participants of the existing traffic disruptions and situations which might impact traffic flow and safety. Road signs within the road area are made of special-purpose retro-reflective material which is to increase the signs' visibility to drivers. Traffic is a dynamic process, so it is crucial that the distance from which drivers are able to read the signs is appropriate.

We can often encounter non-standard road marking, which includes increased vertical signs or signs having higher retro-reflective parameters of the sheeting applied, e.g. "black spot" signs aimed at affecting drivers' frame of mind, acting on their imagination, and making them act reasonably behind the wheel. Non-standard signage also covers active road signs, additionally equipped in beacon lamps which can effectively attract drivers' attention to the message of the road sign. The warnings mainly notify of a nearby pedestrian crossing or sharp curve. They provide information on traffic jams or other types of hazards in motorways and expressways. Such lamps require relevant road traffic instructions, information management system, and power supply. They also must undergo regular technical inspections. Horizontal signage is also of substantial significance for traffic safety. The currently available thermo-hardening and chemical hardening technologies allow for high quality signage. Moreover, acoustic elements are also introduced. They allow the driver to sense the approaching obstacle by hearing.

Speed-reduction infrastructure

Devices which enforce a reduction in speed include speed cushions and speed bumps. Speed cushions are basically devices in the form of a hump to be placed on a local or access road within a built-up area. In addition to public roads, speed bumps can be used in housing-estate areas, on plant premises, or car parks, where the driver must slow down to 5–8 km/h, or if gates are present in access areas. As regards agglomerations, where the number of vehicles is constantly growing, the authorities are planning to introduce the so-called ITS (*Intelligent Transport System*). The most important task of the systems is speed management which should bring about an optimised traffic flow. The ITS system sensors, placed in the area of a given city, define the optimum speed of a vehicle in order to provide a smooth and safe journey. Excessive speed will result in the need to stop at the nearest traffic lights. Retaining the indicated speed will affect the number of stops, reduce traffic jams, and the number of car accidents and their gravity. The ITS can also manage street lighting, adapting it to current weather conditions. This will improve safety of vulnerable traffic participants.

Street lighting

State-of-the-art street lighting can also be of great support for pedestrians and cyclists. The human factor" is a crucial factor in night-time traffic accidents. And the reason for it is the hampered perception of the situation, which could be prevented with suitable lighting [8].

The lack of proper lighting is one of the factors which contribute to the occurrence of accidents involving pedestrians, especially in the evening and at night. The proper direction of luminous flux is strictly connected to the choice of appropriate light fitting with energy-efficient light sources. A substantial characteristic of the light fitting is its tightness, which should ensure protection against dirt gathering on the reflector and the source of light, resulting in lower efficiency. LED lights are characterised by high durability, a wide range of operating temperatures, high luminous efficacy, measured in lumens per wat, high reliability, and resistance to shock, impact and vibrations. The operation of road lighting results in great energy

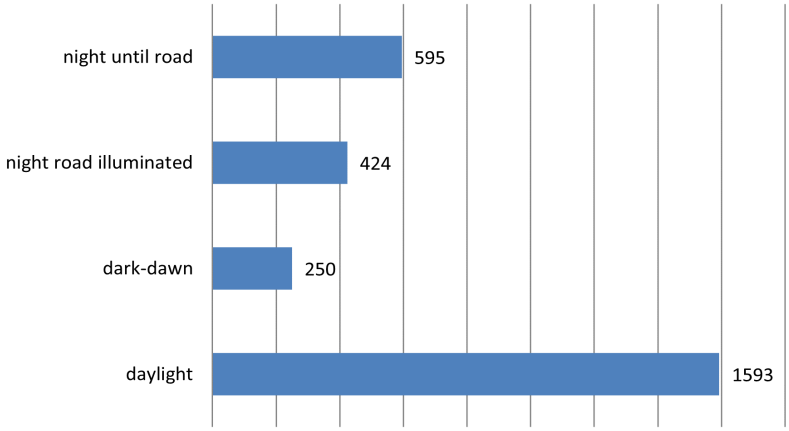

Fig. 1. Lighting impact on accidents in Poland, 2021 (statistical in thousand)
Source: the author (own study based based on police statistic)

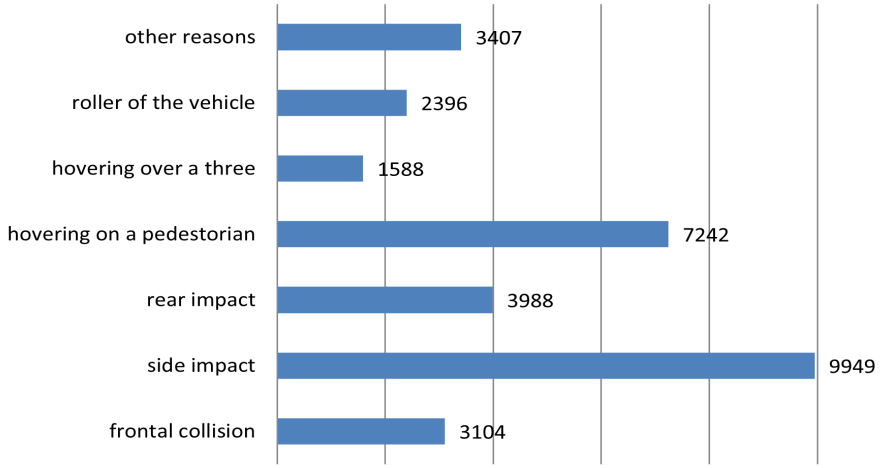

Fig. 2. Types of accidents in Poland, 2021 (statistical in thousand)
Source: the author (own study based on police statistic)

consumption at the level of 114 TWh, which corresponds to 4.3% of global energy consumption [1].

Street-lighting remote control systems are also available, making it possible to automatically change parameters by adjusting them to current conditions. The systems contribute to reducing energy consumption and lighting costs. The system can be managed via a website or a text message. Another available option is the possibility to archive and display alert and measurement data. Study results show that artificial road lighting reduces the number of road traffic fatalities by nearly 65%, the number of injuries by approx. 30%, and the number of road collisions by more than 15% [2].

Concluding remarks

The described concept of a proconsumer small hydropower unit is characterized by simple design and reduced investment costs thanks to the use of largely recycled components.

The design of a small hydropower unit can be implemented with a large participation of direct users of the generated electricity. The system enables to achieve high technical and economic effects in the form of network energy savings. It is especially designed for the applications where the availability of energy is limited. Hybrid bearing of the main shaft of the unit ensures easy start-up and high-energy efficiency with a particularly long service life.

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TRENDS CONCERNING PACKAGING INTENDED FOR COSMETICS

TRENDY DOTYCZĄCE OPAKOWAŃ NA KOSMETYKI

***Summary**: Cosmetic companies struggle for the purchase of their products at the market. Cosmetics packaging may be helpful in this respect. The present article shows the results of the survey studies concerning the most significant properties of cosmetic packaging as well as the types of the cosmetic packaging which mostly satisfies the expectations of the consumers. On the grounds of the conducted studies, we may conclude that the most important property is the convenience of packaging use and the least important is its eco-friendliness.*

***Keywords**: cosmetic packaging, properties, type*

***Streszczenie**: Firmy kosmetyczne walczą na rynku o to, by ich wyroby były kupowane. Opakowania kosmetyków mają być w tym pomocne. W artykule przedstawiono wyniki przeprowadzonych badań ankietowych dotyczących najbardziej istotnych cech opakowań na artykuły kosmetyczne, jak też i rodzajom najbardziej odpowiadającym Konsumentom opakowaniom kosmetyków. Konkluzją tych badań jako najbardziej istotne cechy są: wygoda użytkowania opakowania, najmniej istotną natomiast jego ekologiczność.*

***Słowa kluczowe**: opakowania na kosmetyki, ich cechy, rodzaj*

Introduction

Packaging is one of the commonest and constantly developing products connected with printing. It plays many functions such as transfer of information on the product or marketing news. It is also important to satisfy the taste of the consumers. Producers of the contemporary packaging have, therefore, to focus on many factors so as to sell the packaged product well [1-3].

The developing cosmetic sector follows the global trends. The producers of cosmetic packaging are introducing newer and newer material, technological, constructional and graphical innovations and the novelties in respect of labelling [l]. The first mentioned above innovations are greatly concentrated on ecology and utilization of nanocomposites during manufacture. Cosmetics in packaging made from hydro- and oxy-biodegradable materials e.g. from cellulose appear at the market. The modern packaging material – polylactide – is gradually introduced. One of the companies which have introduced the mentioned solution is the Italian company, Leoplast. Another enterprise, Texen, has developed the project of ecological packaging for compact eye shades, L'Oreal Color Queen; it was aiming at the reduction of the quantity of the used raw materials and components [4]. Owing to this solution, there was obtained a saving of plastic mass by 25% what distinguishes the discussed product at the market in relation to other ones, being less ecological.

In turn, nanocomposites have become other big innovation in respect of cosmetics packaging. Nanocomposite is a material consisting of polymer matrix and nanofiller, the particles of which are dispersed in the polymer [4]. The discussed compounds, as being the subject of the studies of the contemporary science, allow improving the properties of the material in relation to the traditional polymer and they affect the product. They may also contribute to creation of the "intelligent" packaging. Their use increases barrier capacity as regards external factors and resistance to fire; it allows also reducing the amount of preservatives in cosmetic.

The application of smart closures and feeding systems is an interesting and increasingly common technological novelty. We can mention here, for example, "tube in tube" packaging with constant feeder allowing the combination of two active constituents as late as at the moment of their application. Another example of innovative solution in the case of face cream may be production of ionizing packaging, facilitating effective and safe application of the cosmetics, with the use of low energy electric loads. The produced creams have also self-cooling packaging which – in a controlled way – lower the temperature of the packaged product.

The built-in LED lighting in packaging of eyeliner, mascara or lipstick may also a suitable component. It helps the users to see better the performed makeup. Recently, Texen and Mucell companies have introduced a new technology of applicators,

characterized by a diversified shape, permitting adapt the use of lipsticks and lip glosses according to the needs of the user [3]. The constructional-graphic development of cosmetics packaging is the most comprehensive area of innovations. The mentioned packaging are more and more usable, consumer-friendly and also, compliant with the trends of modern contemporary industrial patterns. Additionally, such packaging is better carrier of information about the product owing to development of marking and RFID systems, placed on the labels. The discussed systems protect also the product from theft and imitations or fakes

The most important properties of cosmetics packaging

There was a survey carried out at the Internet pages, with the aim to examine what properties and type of cosmetics packaging were most significant from the viewpoint of the user. The answers of the respondents have been presented in Table 1 – 5 and in diagram 1.

Table 1 contains the results of the survey concerning the answers to the question covering the properties of packaging intended for cosmetics.

According to the results of the survey, as presented in Tab.1, it may be recognized that in general, the respondents were interested in convenience of use of cosmetic package; the readability of the contained information and the possibility of complete emptying of the contents. The eco-friendliness occurred to be the least important aspect.

Table 2 shows the results of the studies according to gender.

It may be followed from the above survey results that women when making a choice of cosmetics are mostly focused on convenience of packaging use, the possibility of complete emptying and readability of information about the product while the graphic form and eco-friendliness are not so important. In turn, men prefer the convenience of use of packaging whereas eco-friendliness is also the least aspect for them.

Table 2. The averaged results of the answer to the question: "Which properties of packaging for cosmetics are in your opinion (Mr/Mrs) most significant?" depending on gender

Gender	Women	Men
Number of respondents	52	48
Eco-friendliness	3.65	2.98
Graphic form	3.73	3.33
Safety	4,.5	3.69
Readability of information	4.31	3.69
Possibility of complete emptying	4.31	3.73
Convenience of use	4.33	4.03

Table 3 presents the answers concerning the properties of cosmetic packaging according to the age of the users.

After having conducted the analysis of the survey results, it can be seen that the eco-friendliness of cosmetic packaging is important aspect for the respondents between 25 and 35 years of life. The persons under 18 years of life consider it as the least significant factor. Graphic form is most attractive for the consumers at 18–25 years of life and 36–45 years of life. The latter factor is least important for the respondents at 26–35 years of life. The safety of cosmetic packaging occurs to be most significant for the customers at the age of 26–35 years of life whereas the discussed aspect ids found at the last place for the persons at the age of 18–25 years. The readability of information is most important for the users from age group of 45–60 years and the least important for the respondents above 60 years of life. For the persons at the age of 45–60 years, the complete emptying of the packaging is least important aspect. In turn, the latter factor is most important for the persons above 60 years of life. The convenience of packaging use is the most important property of cosmetic packaging for the respondents up to 25 years of life whereas for the persons at the age of 45–60 years, it is the least significant factor.

Table 1. The averaged general results of the answer to the question: "What properties of packaging for cosmetics are in your opinion (Mr/Mrs) most significant?"

Number of respondents	Eco-friendliness	Graphic form	Safety	Readability of information	Possibility of complete emptying	Convenience of use
100	3.33	3.54	3.93	4.01	4.03	4.21

Table 3. The averaged results of the answer to the question: "which properties of packaging for cosmetics are in your opinion (Mr/Mrs) most significant?" depending on age

Age	< 18 years	18-25 years	26-35 years	36-45 years	45-60 years	>60 years
Number of respondents	9	43	13	20	9	6
Eco-friendliness	3.45	3.75	4.01	3.89	3.6	3.57
Graphic form	3.7	4.06	3.25	4.05	3.88	3.61
Safety	3.71	2.33	4.00	3.58	3.81	4.48
Readability of information	4,5	3.9	3.85	4.05	4.12	3.77
Possibility of complete emptying	3.54	3.73	3.33	3.88	3.12	3.9
Convenience of use	4.19	4.25	4.01	3.99	3.74	4.07

Table 4. The averaged results of the answer to the question: "Which properties of packaging for cosmetics are in your opinion (Mr/Mrs) most significant?" depending on education

Education	Lack	Primary	Vocational	Secondary	Higher incomplete	Higher
Number of respondents	7	6	7	19	32	29
Eco-friendliness	3.57	3.33	3.29	3.95	4.28	4.41
Graphic form	3.48	3.93	3.12	4.05	3.84	4.25
Safety	4.44	3.78	4.22	3.65	2.67	4.17
Readability of information	3,.62	3.90	3.41	4.10	4.02	3.59
Possibility of complete emptying	3.15	4.00	4.05	4.24	3.99	3.80
Convenience of use	4.09	4.3	4.13	3.8	3.9	3.86

Table 4 contains the results of the survey concerning properties of cosmetic packaging

In the case of the persons without education, the safety of the product is the most important aspect and the possibility of complete emptying is the least important one. For the users with the primary (basic) education, the convenience of use is the most important factors and the eco-friendliness of the packaging is found at the last place. The respondents with vocational education choose also the convenience of use as the most important feature; the safety of the packaging is the least significant factor. The persons with the secondary education place the possibility of complete emptying at the first place and the safety of the packaging is least important for them. For the respondents with higher incomplete and higher education, the eco-friendliness is the most important factor; the safety of packaging is evaluated at the last place. The users with the higher education are interested in readability of information on the packaging at the lowest degree.

The most satisfying types of cosmetics packaging

During the duration of the survey, the respondents indicated the most desirable types of cosmetic packaging. The question was optional, so not everybody asked this question. It was dictated by the fact that not everybody uses the given below types of packaging. The answers of the respondents are given in table 5 and in figure 1.

Fig. 1. Bar chart presentation of the answers of the respondents to the question: "Which types of cosmetic packaging are most satisfactory for you?"

Glass jars e.g. for creams and bottles with feeder or pump are the types of cosmetic packaging which are most satisfactory for the respondents. On the other hand, the tubes with cap, made from plastic as well as aluminium, are found at the last place. Glass jars are easy for cleaning and used again; hence, there is their high position in the results of the survey. In turn, the tubes with caps were evaluated at the lowest place due to the lack of convenience of use because the plastic tube is not deformed after squeezing a certain amount of the product; gradually with their use, it is difficult to use the

Table 5. Presentation of the respondents' answers to the question: "Which types of packaging are most satisfactory for you?"

Type of packaging	Number of respondents	Mean score evaluation
Plastic jar	81	3.29
Glass jar	75	3.67
Plastic tube with flip-top closure	84	3.35
Plastic tube with cap	83	3.05
Aluminium tube with cap	81	2.93
Plastic bottle with flip-top closure	79	3.27
Bottle with feeder/pump	83	3.75
Bottle with dosing pipette	59	3.3
Bottle with atomizer	69	3.4

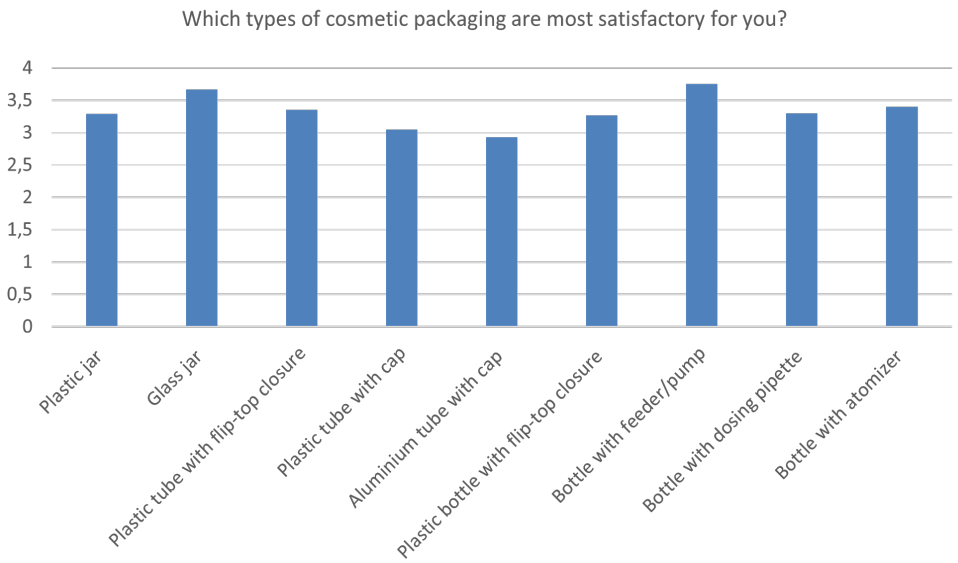

Fig.1. Bar chart presentation of the answers of the respondents to the question: "Which types of cosmetic packaging are most satisfactory for you?"

remaining final parts of the product. Aluminium tube is deformed during squeezing the product and – in contrary to plastic tubes – it does not come back to its initial form.

Summing up

The convenience of use of the packaging was the most significant feature in cosmetic packaging. The same was referred to **readability of information** on the packaging; the **eco-friendliness** was found at the last place. Such situation comes from the fact that the contemporary packaging is more and more frequently made from paper material, so it happens that the discussed solutions are not compliant with the convenience of use as the paper become soft in contact with water.

The conclusions

The producers of cosmetic packaging are competing in respect of introducing more and more modern solutions in their products. Apart from satisfying the needs of the potential users of the discussed packaging, they have the task to adapt to the pro-ecological EU Directives. Gradually with the time, there will be more polymer packaging introduced to the market and together with their popularity and the awareness of the consumers is expected to rise.

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PORTABLE DAM AS A WAREHOUSE FOR RETENTION AND USE OF RAINWATER

PRZENOŚNY PRÓG PIĘTRZĄCY JAKO MAGAZYN DO RETENCJONOWANIA I WYKORZYSTANIA WODY OPADOWEJ

***Summary**: The portable dam is a monolithic device for storing and retaining rainwater. Ways of using portable weirs can be divided into categories depending on the length of the damming period. Short-term damming (several – several hours) may be useful in carrying out hydrological, hydraulic and biological measurements. In forest areas, pastures and meadows, it enables the damming of water necessary for the intake of water by the fire brigade while extinguishing the fire.*

***Keywords**: water breaking threshold, rain water, little retention, rainwater management*

***Streszczenie**: Przenośna zapora to monolityczne urządzenie do przechowywania i retencjonowania wody deszczowej. Sposoby wykorzystania jazów przenośnych można podzielić na kategorie w zależności od długości okresu piętrzenia. Piętnienia krótkotrwałe (kilka-kilkanaście godzin) mogą być przydatne przy wykonywaniu pomiarów hydrologicznych, hydraulicznych i biologicznych. Na terenach leśnych, pastwiskach i łąkach umożliwia spiętrzenie wody niezbędnej do poboru wody przez straż pożarną podczas gaszenia pożaru.*

***Słowa kluczowe**: próg wodoszczelny, woda opadowa, mała retencja, zagospodarowanie wód opadowych*

Introduction

At the Department of Water Engineering and Management of the Institute of Technology and Life Sciences in Falenty, a project was developed and prototypes of portable devices that can be used to raise the water level were made in cooperation with an external production plant. in a small watercourse or ditch, facilitating its collection without the need to obtain a water permit for the construction of a water device. The portable dam is a monolithic water-filled device made of made of material reinforced with polyester mesh, coated with PVC on both sides. It is equipped with four fire valves, two of which on the upper water side are used for gravity filling of the threshold with water in the watercourse channel, while two valves on the lower water side are used to empty the device or regulate the water outflow. A hole located on the crown of the threshold is used for venting. The weight of the threshold is about 20 kg, which allows it to be transported by two adults without the use of additional equipment. The threshold enables relatively quick damming of water up to a height of 60 cm, which does not require obtaining a water damming permit.

Ways of using portable weirs can be divided into categories depending on the length of the damming period. Short-term damming (several – several hours) may be useful in carrying out hydrological, hydraulic and biological measurements. In forest areas, pastures and meadows, it enables the damming of water necessary for the intake of water by the fire brigade while extinguishing the fire. When carrying out minor repairs of hydrotechnical devices, a portable damming dam enables quick closing of the flow for a specified period of time without making costly partitions. Long-term damming can be used mainly by farmers – damming the water in the ditch allows it to be used for e.g. irrigation purposes – for sprinkler pipelines or irrigation ditches, or for taking water for pasture for farm animals. The main feature of the designed portable devices is their mobility, easy operation, multifunctionality and relatively low price (1,800–2,100 PLN). Not without significance is also the small and only temporary impact of the considered structure on the natural environment.

Additional information

Dimensions 1. width at the bottom equal to 0.8 m, then width at the crown 2.6 m^2. width at the bottom equal to 1.5 m, then width at the crown 3.3 m The amount of stored water and the length of backsides: The use of a portable dam in the riverbed with a bottom slope of 1.5 ‰ made it possible to store 245 m^3 of water in the upper stand of a structure with a base width of 1.50 m. Using a threshold with a base width of 0.80 m, this volume decreased to 163 m^3 of water. The ranges of the backwaters created during the simulation were 400 m and 410 m, respectively.

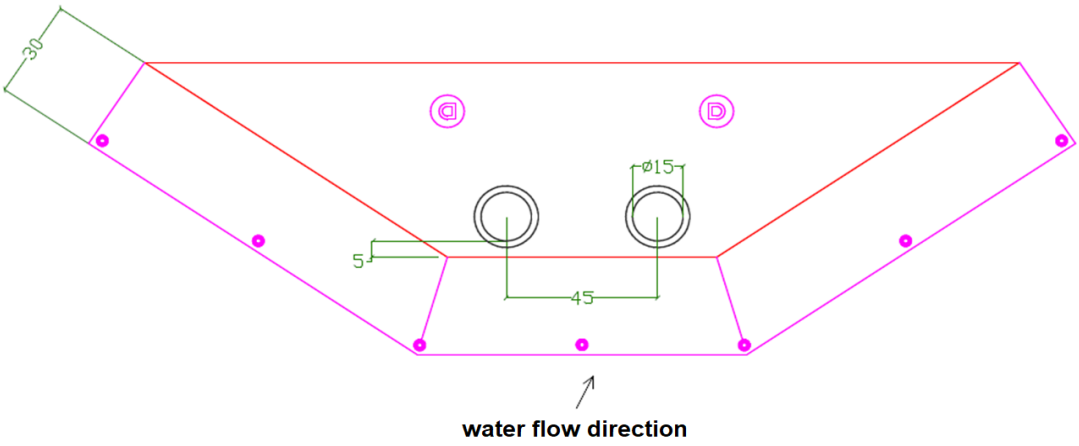

Fig. 1. Design of a portable water dam, part 1

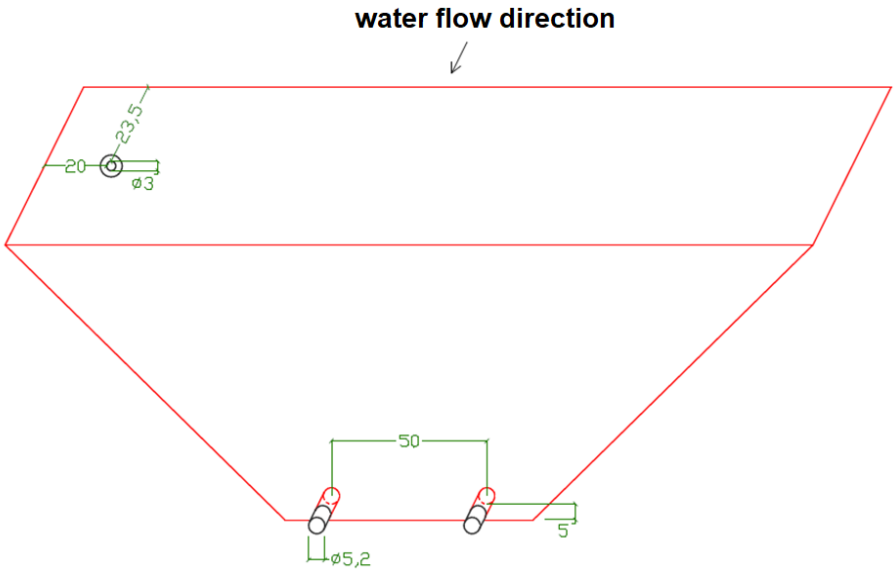

Fig. 2. Design of a portable water dam, part 2

Fig. 3. The threshold apron in the upper stand

Using the water dam

The water damming threshold can be used:

- in agriculture,
- in scientific and research activities,
- in the fire brigade,
- by local organizations, incl. Water Companies,
- in forest areas, pastures and meadows - damming up the water necessary for firefighting,
- in carrying out hydraulic, hydrometric and biological measurements,
- during minor repairs of hydraulic equipment,
- use of stored water by farmers,
- for irrigation purposes – at sprinkler pipelines or irrigation ditches,
- for watering cattle and other pasture animals,
- for use on an agricultural holding for purposes other than food, eg for washing agricultural machinery.

Advantages of a multifunctional device

The advantages of a multifunctional device are as follows:.

1) Mobility - the possibility of multiple installation of the threshold in any place and time depending on the user's needs
2) Relatively low price – compared to permanent damming structures, the price is up to several times lower,
3) No need to apply for a building permit as opposed to permanent buildings,
4) Low weight – about 20 kg, which makes it possible to move the threshold to any place without the use of specialized equipment,
5) Durability of the device,
6) Simple operation of the device,
7) Multifunctionality 8. It takes no more than 2 people to assemble and disassemble the threshold,
8) A very small scope of preparatory works in the watercourse bed – limited to removing large movable obstacles and/or mowing lush vegetation in the bed,
9) Short installation and filling time of the device (depending on the speed flowing before the damming of the water – from 10 to 60 minutes,)
10) Small and periodic impact of the device on the environment.

Disadvantages and problems of the multifunctional device

The disadvantages and problems of the multifunctional device are as follows:

1) Lack of resistance to deliberate, harmful effects of third parties,
2) With the depth of flowing water, more than 20 cm, it is necessary to use one meter of steel bars to fix the apron on the bottom – in order to maintain the stability of the device,
3) Regardless of the type of soil in the bottom and slopes of the trough, it is impossible to completely eliminate water seepage under the device.

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