Comparative analysis of land management in the world

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Abstract. The article studies and compares agricultural land management performance criteria applied in different countries worldwide. It is stated that there are different definitions and classifications of agricultural lands in different countries, which implies different indicators of land use efficiency. Sometimes these indicators cannot be correlated or compared with each other. It is suggested using such criteria as arable land area and fodder yield per 1 ha as the most unified and appropriate ones.

1. Introduction

Agricultural land covers about 38 % of the world's land area, arable land makes 11 %. This means that the ploughness level of agricultural land reaches 30 %. There is less that 0.7 ha of agricultural land and 0.2 ha of arable land per each of the world's inhabitant [7, 12, 16]. Though, since 1993, there have been taken a number of attempts to standardize national systems and to develop a unified international land accounting system, different approaches to the issue still exist [1, 3, 6].

The aim of the research is to make a comparative analysis of basic performance indicators of agricultural land use management in the world.

To achieve the aim, the following objectives are to be put:

– to collect necessary data;
– to compare, correlate the basic performance indicators and choose the most optimal ones;
– to use them for the analysis of agricultural land condition and agricultural land use performance.

2. Objects and methods of research

The research objects are agricultural lands in Europe (including Russia and Belarus), the USA and Canada. Analytical and comparative methods are used to achieve the aim of the research. According to Food and Agricultural Organization of the United Nations (FAO) [17], agricultural lands are divided into crop areas, permanent meadows and pasture areas. Crop areas are divided, in its turn, into permanent crops and arable areas; arable areas are subdivided into temporary crops, temporary meadows and fallow areas.

3. Results and discussions

According to Belarus State Land Cadastre data, dated the 1st of January, 2014[5], agricultural land area is 8,726 M ha (42%) including 5,560 Mha (26.8 %) of arable land area, with the total area of the country 20,760 M ha. The level of ploughness of agricultural lands reaches 63.7 %. There is 0.9 ha of agricultural land area, with 0.6 ha of arable land area per each resident of Belarus.

According to the cadastral data, 1 January 2015, the total area of Russia (with Crimea) is 17151442 sq. km, the area of productive lands is about 9 million sq km; i.e. 11% of the world's productive land area. The number of productive soil is 6ha per capita, with arable land area 130.3 million ha and the level of ploughness is 7.7% [7, 14].

In the frame of land accounting system "EC CORINE Land Cover" agricultural lands are classified into arable land, permanent crops, pasture area and other agricultural areas.

Analyzing national and international agricultural land classification and accounting systems, we pay attention to the following: in other countries but Belarus and Russia, arable lands are considered to be those that in Belarus are classified as arable and permanent meadow cultivated. It covers the area of 7,618 M ha (36.7 % of the total area and 87.3 % of the agricultural area). Such "arable" area per one resident of Belarus is 0.8 ha.

Arable lands in Russia are defined as regularly cultivated agricultural lands, plowed and sown, including planting perennial grasses, emergency fields, areas under glass and fallow areas [9].

In Belarus and Russia, permanent meadows and pastures, which cover vast areas in some countries, are considered to be agricultural lands used to cultivate perennial grasses and lands with natural grass stand [13]. The area of such lands is only 974.4 Mha, or 11.1 % of total agricultural land area, with this number constantly decreasing. Meadow lands are not regarded as agricultural lands in cadastral systems of some countries. This approach was often suggested being implemented in Belarus national agricultural politics.

Thus, taking into account all mentioned above, to compare land resource potential of different countries it is reasonable to consider arable land area as a more informative indicator. According to FAO (2009) [2, 16], the countries with the most amount of arable lands are China (220 million hectares), the USA (163), India (158), Russia (122), Brazil (61), Australia (47) and Canada (45). Area of arable land per one inhabitant in a country should also be taken into account. Thus, in Australia, the value is 2.2 ha /person, Canada – 1.5, Kazakhstan – 1.5, the Republic of Niger – 1, Russia – 0.9, Argentine – 0.8, Ukraine – 0.7. The value in Japan is only 0.03 to compare.

It is desirable to compare these values with those of the countries having the same climatic, natural, social and economic conditions. For example, the European Union countries neighboring Belarus have the following values: Poland -0.3 ha/person, Lithuania -0.6, Latvia -0.5. In Northern Europe the values are the following: Estonia - 0.5 ha/person, Denmark – 0.4, Finland – 0.4, Sweden – 0.3 and Norway – 0.2. The most developed European countries have less arable area per inhabitant: France – 0.3 ha/person, Germany, Great Britain, the Netherlands and Switzerland – 0.1. Thus, in terms of area of arable land per one inhabitant, Russia and Belarus are among the world leaders.

However, the question is if it is possible to compare land quality and land use efficiency in different countries.

Unfortunately, there are no unified approaches to compare quality of lands in different countries, including agricultural and arable lands. In most countries, there are national methods to assess and classify land quality according to internal purposes.

Typically, to make a cross-country comparison, specialists apply indirect correlation of agricultural land use efficiency rates in value terms and/or physical terms (figure 1).

Potentially, the best relative indicator of agricultural land use efficiency might be land productivity, for example, fodder yield per hectare. However, such approach is not widely spread world wide. International organizations more often use methods of arable land assessment based on average grain and leguminous crop capacity, especially wheat. It is quite reasonable, since grain and leguminous crops are of strategic value all over the world and cover more than a half of the whole cultivated area of the world.

Wheat plays the leading role in gross grain yield structure of the world and it determines food safety policy and agriculture economy both at the global and local levels.

The leading European countries (Germany, Great Britain, France, Denmark and others) have reached wheat crop capacity of 7000-8000 kg/ha [2, 3, 6], which is considered to be close to physiological limit, according to some specialists [6]. Belarus, as well as Lithuania, Latvia and Poland, have yielded more than 3300 kg/ha (average value of 2005-2012 years [15]). Russia have gained 2390 kg/ha. It should be noted that it is not quite correct to compare wheat crop capacity in different countries if we take into account the difference in climatic and environmental conditions that influence the agriculture structure of a country [10].

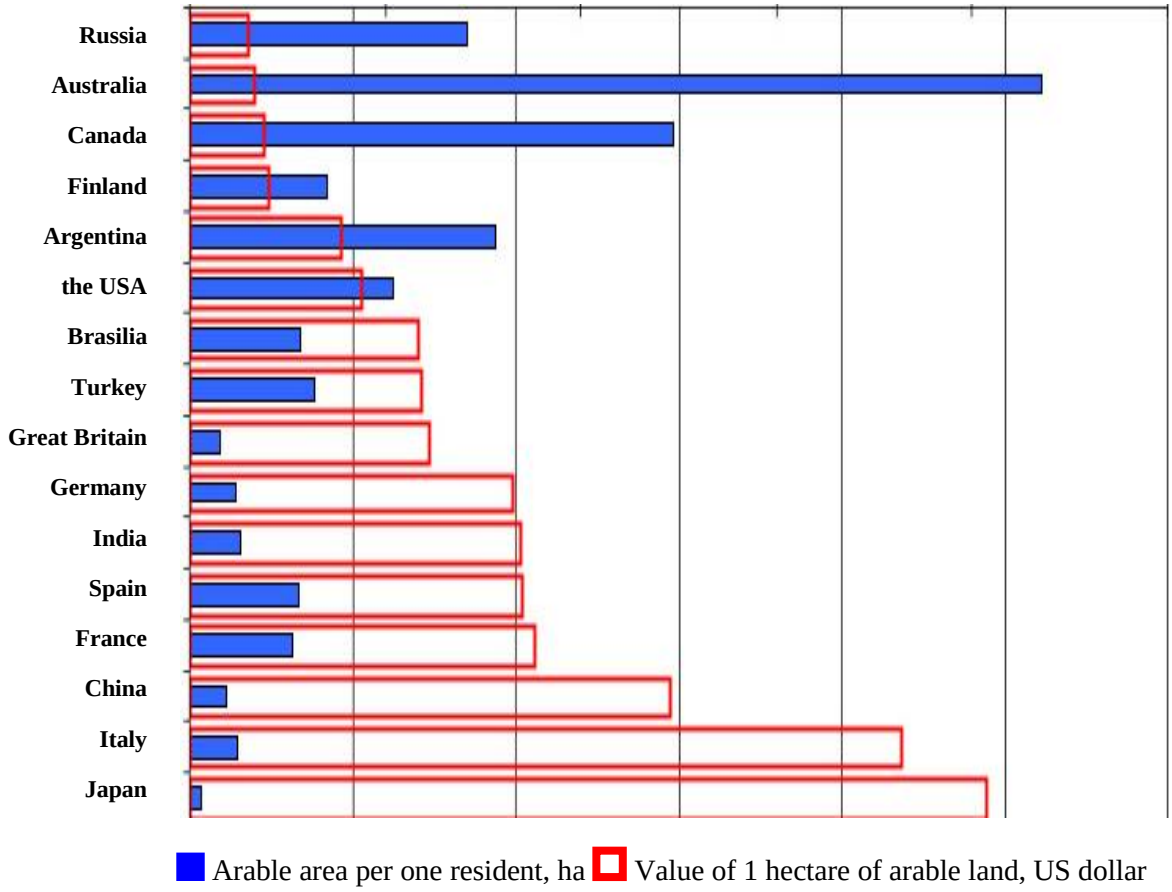

Figure 1. Value of 1 ha of arable land and the amount of arable land per one resident in some countries.

However, the climatic and environmental conditions of the southern part of Sweden, which is most agriculturally developed, and social and economic priorities are rather comparable with those in Belarus. Nevertheless, the average wheat crop yield in Sweden is 6000 kg/ha.

Thus, taking into account the interconnection of crop capacity of different agricultural plants and the fact that crop capacity conditions animal agriculture productivity, it is possible to say that Belarus and Russia have significant, almost double potential of national agriculture. It is necessary to fulfill the potential in the nearest future by using modern techniques and technologies of land management, agro chemistry, genetics, mechanical operations etc.

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