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(Geneva, 2-4 July 2003)

AN ANALYSIS OF AGRICULTURAL CENSUSES AND MAIN ISSUES FOR CONSIDERATION IN THE FUTURE**

Invited paper submitted by FAO

I. INTRODUCTION

1. To date, eight decennial Programmes for the World Census of Agriculture (WCA) have been published. The International Institute of Agriculture, predecessor of FAO, prepared the 1930 and 1940 Programmes, and FAO issued the Programmes for the WCA 1950, 1960, 1970, 1980, 1990 and 2000. The purpose of these Programmes was to guide countries to use standard concepts and definitions and a standardised list of items in view of obtaining internationally comparable data. In addition, FAO published main census data by country in a standard format, international comparison tables for main census items and the information on methods used by different countries. FAO is now starting preparations for the WCA 2010 Programme, to be launched in 2005.

^{*} Due to the late submission of this paper, it could neither be translated nor reproduced.

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- 2. The purposes of this paper are: (i) to present some analyses of agricultural census results recently done by FAO and (ii) to seek advice on priorities to be given by FAO in the future work including the preparation of the next FAO WCA Programme. One of the priorities proposed is an analysis of changes of agricultural structures. It is now felt that not enough attention was given by FAO in the past to this subject. This is an important subject as changes appear to be considerable in European (and other OECD) countries, as illustrated below. In some other regions different trends were noted.
- 3. It should be noted that different regions may have different priorities. FAO expects from this meeting to learn about European priorities.

II. ANALYSIS OF AGRICULTURAL CENSUSES

- 4. FAO advice to counties given in the decennial WCA Programmes, concerning the analyses of the agricultural census data, covered tabulation plans of data aggregates, including extensive cross tabulations. National results were compiled by FAO which publishes country data in standardised tables for international comparison for each decennial Programme. Further analysis was done by FAO in connection with data from the 1950 WCA and 1970 WCA:
 - Three studies (including graphic presentation) of 1950 WCA data classified by size of holding, concerning: (i) number and area of holdings, (ii) land tenure and (iii) land use, were published (see [4], [5] and [6]).
 - Gini coefficient (or index of concentration) and median size of agricultural holdings, using land area as a measure of size, were calculated using 1970 WCA data and published (see [3]).
- 5. Additional analysis was made by FAO in 2002, for the whole world, using data available from the last three decennial censuses: 1990, 1980 and 1970 (see [2]). A selection of results of these analyses was extracted for European countries (35 countries in 1990) and OECD countries outside Europe (8 countries) and is enclosed herewith in two tables (see Annex 1 and Annex 2). The two subjects selected are: (1) Number and Area of Holdings and related parameters and (2) Cattle. Only countries for which a time series was available are included. It happened that such data were available for OECD countries only. The subject Cattle was included to illustrate the trend in specialization of agricultural holdings concerning one important agricultural product. Comments on these two tables are given below:

Number and Area of Holdings, Average and Median Sizes, and Gini Coefficient¹: 1990, 1980 and 1970 Rounds of Agricultural Censuses (Annex 1)

6. Data are available for 20 (out of 43) countries. It can be seen that, in all reporting countries except Turkey, the <u>average size of holdings</u> was increasing steadily in the period of

¹ In this paper Gini coefficient or index of concentration is a measure of equitability of land distribution into agricultural holdings. It may vary from 0, when all holdings have the same area, to 1, when all land is in 1 holding while the size of all other holdings is 0.

20 years (depending on the country this period ranges from 17 to 25 years), although the total area of holdings was decreasing. This can be explained by the fact that the number of holdings was decreasing faster, in the same period, than the total area in most of the countries. The largest increases of the average size in the 20-year period were observed in Germany (113 percent), Luxembourg (87 percent), Belgium (84 percent) and Denmark (63 percent). The smallest increases of the average size were observed in Spain (6 percent), Italy (8 percent), Portugal (10 percent) and U.S.A. (12 percent). In Turkey, the average size decreased while the total area of holdings increased.

- 7. In calculating and comparing internationally <u>the medians and Gini coefficients</u>, based on classification by size of area of holdings, there are two methodological problems:
 - (i) Country data are available as <u>classified by size groups</u>. Interpolation is therefore, required. This was done by FAO using log-normal properties of the distributions involved. Such calculations can be done better at country level, using raw data.
 - An important factor, which has direct repercussion on estimation and (ii) international comparison of medians and Gini coefficients, is the criterion for classification by size applied by different countries. FAO was recommending in all World Programmes classification of the number and total area of holdings by size of total area of holding. This classification was not found suitable by some countries, which used classifications by agricultural land (mostly Europe), cropland, cultivated land, arable land, etc. Furthermore, some of the countries not using total area as criterion for classification tabulated total area of holdings by size while others tabulated only agricultural or other area. In most of countries, however, the problem associated with the use of different classifications is of limited importance since agricultural area and productive area are, generally, not much different from total area, the difference being often less than 10 percent. The only major problem exists in Finland as arable land used for classification in this country is only 20 percent of the total area of holdings. This is why the average size of holdings, based on total area, is not in line, for this country, with the medians, which are based on classification by arable land. The Gini coefficient for Finland is very low.
- 8. <u>Comparison of Gini coefficients within individual countries over time</u> is not affected by problems mentioned above, as individual counties normally use the same classification by size in consecutive censuses. As can be seen from Annex 1, a relatively large increase in the Gini coefficient occurred in the period of 20 years in Germany, Greece, Netherlands, Japan and Turkey. A relatively large decrease can be noted in Austria, Belgium and Rep. of Korea. In the remaining 12 reporting countries the coefficient did not change significantly.
- 9. <u>Comparison of Gini coefficients between countries</u> is affected by the use of different classifications by size, as in this case they are not comparable strictly speaking. Countries using different classifications are, therefore, compared separately:

- 10. For eight countries, data available refer to <u>agricultural area classified by size of agricultural area</u> (France, Germany, Greece, Ireland, Luxembourg, Netherlands, Norway and Portugal). In the 1990 census the highest Gini coefficients in these countries are found in Portugal (0.78) and Germany (0.68) and the lowest in Norway (0.46).
- 11. For five countries, data available refer to <u>total area classified by size of total area</u>. In these countries the Gini coefficients calculated for the 1990 census were as follows: Italy 0.78, Spain 0.86, United Kingdom 0.67, Turkey 0.61 and U:S.A. 0.74.
- 12. For two countries, data available refer to <u>total area classified by agricultural area</u>. In these countries the Gini coefficients calculated for the 1990 census were: Belgium 0.56 and Denmark 0.44.
- 13. For the remaining five countries, data available refer to five different classifications.

Holdings Reporting Cattle and Number of Heads of Cattle: 1990, 1980 and 1970 Rounds of Agricultural Censuses (Annex 2)

- 14. Noticing that major changes have occurred in cattle raising in Europe and in OECD countries, an analysis is presented here of the number of holdings reporting cattle and of the related number of animals. Data were available for 17 (out of 43) countries. A process of specialization of cattle raising holdings can be observed at two levels: firstly the total number of holdings has decreased in all reporting countries except in Poland; secondly, the proportion of holdings raising cattle has also decreased, although the total number of cattle did not change much. As a consequence, the average number of cattle per cattle raising holdings has increased considerably. Detailed comments are given below:
- 15. In the period of 20 years (actually this ranges from 17 to 24 years) the <u>number of holdings reporting cattle</u> was reduced to less than a half in 8 countries: Belgium, Denmark, France, Germany, Greece, Italy, Norway and Australia. The largest decrease was observed in Greece (84 percent) where the number of cattle has decreased by 28 percent. Other large decreases were observed in Italy (67 percent) and Denmark (64 percent).
- 16. The average number of cattle per holding reporting cattle has increased in all 17 reporting countries in the period of 20 years. The largest increase, more than three times, was observed in Greece. In eight countries this increase was more than two times: Belgium, Denmark, France, Germany, Italy, Netherlands, Norway and Australia. Observing the 1990 census data it can be noted that this average varies very much: from 3.8 in Poland, 6.4 in Portugal and 13.0 in Greece to 86.0 in the United Kingdom, 89.0 in Canada and 308.8 in Australia.

III. MAIN ISSUES FOR CONSIDERATION IN THE FUTURE

17. The main objectives of the next agricultural census 2010 are proposed to be similar to previous programmes. These are:

- (i) to collect data on agricultural structures which do not change rapidly from year to year and to present them at national and sub-national levels, and
- (ii) to provide a frame for other agricultural surveys based on agricultural holding.
- 18. The basic characteristics of the WCA 2010 are proposed to be the same as for the previous programmes, with possibly more emphasis given to data relevant to food security:
 - (i) The concepts and definitions, such as definition of household and occupation, should be harmonized, to the extent possible, with those of other international organizations (UN, ILO, etc.).
 - (ii) The scope of the agricultural census should be limited to essential data in order to limit the size of the questionnaire and ensure, thus, the success of the census. Additional data may be collected through specialized surveys.
 - (iii) The changes with respect to the previous censuses should be kept to the minimum in order to ensure data comparability over time.
- 19. The following changes, referring to the list of items, may be considered:
 - (i) To collect more data on livestock. This is important for countries not organizing special livestock censuses.
 - (ii) To give more emphasis to collecting data relevant to food security (such as availability of food storage, and environmental issues). In addition to data to be collected from agricultural holdings, some data which can be collected at village and/or community level are also proposed (see below).
 - (iii) To improve definitions and census coverage (minimum size of holding, definition of holder, etc.) relevant to women's participation in agriculture, in order to avoid male-bias.
 - (iv) To simplify sections concerning soil characteristics and use of fertilizers and pesticides proposed in the WCA 2000 Programme since detailed data items proposed do not appear to be realistic and could not be collected by any country so far.
 - (v) To reconsider collection of data on crop production which is not a structural item, and as such was excluded from the two previous programmes. These are important data, relatively easy to collect, which are actually collected in many agricultural censuses. In many countries farmers can provide better information on crop production than on crop areas.
- 20. The amount of data proposed for collection in the FAO Programme for the WCA 2010 will not be increased. Additional analysis of data and an improved dissemination of census results, using Internet and CD-ROMs, will be recommended.
- 21. <u>An improved data analysis:</u> In previous FAO WCA Programmes data analysis was limited to the proposed tabulation plan. The next programme may recommend calculation of (i) Gini coefficient, medians, etc. (ii) time series tabulations for the most important data, and (iii) graphic presentation of data. The countries are in a better position to do some of this work than FAO as, for example, Gini coefficient may be calculated using raw data, while the time series may require detailed knowledge of changes in methodology and coverage for

successive censuses. The analysis of Gini coefficients at sub-national level (not treated by FAO), may be useful to countries. It may reveal differences between agricultural structures for the administrative units, that may help in formulating agricultural polices and agrarian reforms. A chapter (or a supplement) may be included in the next WCA Programme to provide advice to countries on this matter.

- 22. <u>An improved dissemination of data</u> using new facilities available, such as Internet and/or CD-ROMs can be recommended. This may include:
 - (i) Census results, or
 - (ii) Raw data (or a sample) for further analyses by users, taking precautions to safeguard data confidentiality.
- 23. A chapter may be included in the next WCA Programme to provide advice to countries on this matter.
- 24. Concerning data relevant to <u>food security</u>, additional data can be collected using a <u>village infrastructure questionnaire</u>. This approach is cheap and is used by many countries, when the census frame is prepared. International coordination is required in order to standardize concepts and data format and to make data internationally comparable. It is a good source of data concerning village potentials and agro industry information, such as communication facilities, availability of storage facilities, local market, cottage industries, financial services, etc. Such data would be useful not only for making an inventory of rural infrastructure available, but also for monitoring the progress made in this area. A chapter (or a supplement) on village infrastructure statistics may be included in the next FAO programme to provide advice to countries on this matter.

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ANNEX 1

Number and Area of Holdings, Average and Median Sizes, and Gini Coefficient: 1990, 1980 and 1970 Rounds of Agricultural Censuses [11/2].

European countries and DECD countries outside Europe	Census year	Number of holdings	Area of holdings (Ha)	Average size (Ha)	Median size for number	Median size for area (Ha)	Gini Coefficient
EUROPEAN COUNTRIES							
Austria ⁽³⁾	90	273 210	7 217 498	26.42	8.80	46.00	0
103010	80	312 418	7 325 863	23.45	8.70	50.00	ő
	69	362 216	7 490 463	20.68	7.30	48.00	0.
Dolaium (4)	90	87 180	1 400 364	16.06	8.60	31.00	0
Belgium ⁽⁴⁾	79	119 277	1 475 140	12.37	6.50	24.00	0
	70	184 005	1 602 864	8.71	4.20	18.00	0.
Denmark (4)	89 79	81 267 122 722	2 774 127 2 919 721	34.14 23.79	24.00 17.00	50.00 36.00	0.
	70	140 197	2 941 316	20.98	15.00	30.00	ŏ
Finland ⁽⁵⁾	90 80	199 385 224 721	12 338 439 12 800 326	61.88 56.96	8.20 7.70	14.00 11.00	0
	70	224 721	15 150 223	50.90	6.60	9.40	0.
	/0	291 201	16 160 223	50.97	6.60	9.40	0
France (4)	89	1 016 755	31 985 606	31.46	16.00	52.00	0
	80	1 262 672	33 648 959	26.65	14.00	42.00	0
	71	1 587 643	35 039 217	22.07	11.00	33.00	0
Germany (4) (6) (7)	95	566 900	17 156 900	30.26	11.00	73.00	0
Germany (1997)	79	850 006	14 487 137	17.04	8.80	26.00	0
	71	1 074 637	15 236 139	14.18	7.30	20.00	0
9.00					_		
Greece ^{(4) (6)}	95	802 400	3 578 200	4.46	2.40	9.00	0
	71	1 047 260	3 586 294	3.42	2.30	5.60	0
Ireland ⁽⁴⁾	91	170 578	4 441 755	26.04	18.00	41.00	0
	79	263 558	5 704 381	21.64	13.00	33.00	0
	70	279 450	5 650 000	20.22	13.00	32.00	0
Italy	90	3 023 344	22 702 356	7.51	1.80	41.00	0
	82	3 270 560	23 559 924	7.51	1.90	36.00	0
	70	3 607 262	25 064 218	6.95	1.90	28.00	0
Luxembourg (4)	90	3 803	126 298	33.21	24.00	58.00	0
	80 70	5 173 7 608	130 061 135 143	25.14 17.76	20.00 13.00	42.00 28.00	0
	,,,	1 000	100 143	12.70	10.00	20.00	0
Netherlands ⁽⁴⁾	89	127 367	1 865 031	14.64	10.00	29.00	0
	79	148 674	2 033 483	13.68	9.70	23.00	0
	70	184 613	2 142 597	11.61	8.40	19.00	0
Norway (4)	89	99 382	991 077	9.97	7.10	16.00	0
torway	79	125 302	953 528	7.61	5.10	12.00	0
	69	154 977	955 333	6.16	4.20	9.20	0
Destroat (4)		F0.1.11	100000	4.9			_
Portugal ⁽⁴⁾	89 79	594 418 783 944	4 005 594 5 182 902	6.74 6.61	1.60	61.00 100.00	0
	68	811 656	4 975 000	6.13	1.50	57.00	Č
N!-			40.0				
Spain	89 82	2 284 944 2 375 327	42 939 208 44 311 769	18.79 18.66	2.60	240.00 220.00	0
	72	2 576 327	44 311 769 45 702 620	18.66	3.00	220.00	0
	1	_ 211 030				210.00	
Switzerland (3)	89	108 296	1 262 167	11.65	9.00	20.00	0
	79	125 274	1 271 545	10.15	7.00	18.00	0
	69	152 859	1 292 110	8.45	5.80	14.00	0
United Kingdom (8)	93	244 205	17 144 777	70.21	27.00	170.00	0
Onited Kingdom	79	268 560	17 568 330	65.42	24.00	160.00	0
	70	326 698	17 992 312	55.07	21.00	150.00	C
DECD COUNTRIES							
OUTSIDE EUROPE							
OV I SIDE EUNOPE							
Japan ⁽⁹⁾	95	3 444 000	4 120 000	1.20	0.73	2.20	0
	79	4650214	4 772 093	1.03	0.61	1.60	0
	70	5 354 074	5 389 000	1.01	0.63	1.50	0
Korea, Rep. of ⁽⁹⁾	90	1 768 501	1 857 491	1.05	0.81	1.40	0
	80	2 157 555	2 025 795	0.94	0.75	1.20	0
	70	2 421 420	2 132 233	0.88	0.71	1.20	(
Turkey	91	4 068 432	23 451 099	5.76	3.00	13.00	
Turkey	80	4 068 432 3 650 910	23 451 099 22 764 029	6.76	3.00	13.00	0
	30	2 000 910	22 104 029	0.24	3.00	15.00	
J.S.A.	87	2 087 769	390 311 617	186.95	52.00	740.00	0
	79	2 476 340	394 061 235	159.13	51.00	640.00	0
	69	2 730 250	430 321 000	157.61	55.00	530.00	Č

⁽¹⁾ Includes holdings without land. Includes only countries for which data for the 1990 census round, and also for the 1980 and/or 1970 census rounds were available.

⁽²⁾ Gini coefficient and median sizes were calculated using the <u>land area</u> of holdings as the measure of size. Many countries, particularely in Europe, do not use the total area of holdings as the measure of size, which is recommended by FAO, but different criteria. These criteria are indicated in footnotes.

^[3] Classification by productive area.

⁽⁴⁾ Classification by agricultural area.

^[5] Classsification by arable land.

^[6] Data source: Eurostat - Farm Structure - 1995 Sample Survey.

 $^{^{\}mbox{\scriptsize [7]}}\,\mbox{Data}$ for 1979 and 1971 exclude Germany, Dem. Rep. of.

⁽III) Area classified by size of holding for 1993 excludes 156 223 Ha reported by Minor Holdings.

⁽⁹⁾ Classification by cultivated land.

ANNEX 2
Holdings Reporting Cattle and Number of Heads of Cattle:
1990, 1980 and 1970 Rounds of Agricultural Censuses ⁽¹⁾

1990, 1980 and 1970 Rounds o	7 Agricultural	Censuses `	Cattle				
European countries and OECD countries outside Europe	Census year	Total number of holdings	Holdings reporting Number of heads				
			Number	Percent of total	Total	Average per holding reporting	
EUROPEAN COUNTRIES							
Austria	90	273 210	139 951	51.2	2 538 766	18.1	
	80	302 579	178 980	59.2	2 536 400	14.2	
	70	362 216	244 600	67.5	2 416 000	9.9	
Belgium	90	87 180	58 205	66.8	3 248 780	55.8	
	79	119 277	82 503	69.2	3 058 163	37.1	
	70	184 006	127 907	69.5	2 887 000	22.6	
Denmark	89	81 267	37 130	45.7	2 221 485	59.8	
	79	122 722	65 678	53.5	3 035 396	46.2	
	70	140 197	103 465	73.8	2 840 000	27.4	
France	88	1 016 755	503 659	49.5	21 217 251	42.1	
	80	1 262 672	735 902	58.3	23 213 004	31.5	
	71	1 587 643	1 051 514	66.2	21 400 000	20.4	
Germany ⁽²⁾ ⁽³⁾	95	566 900	287 100	50.6	15 731 000	54.8	
	79	850 006	537 116	63.2	14 937 682	27.8	
	71	1 074 637	793 425	73.8	14 674 000	18.5	
Greece ⁽³⁾	95	802 400	40 100	5.0	520 200	13.0	
	81	998 876	137 060	13.7	824 056	6.0	
	71	1 047 260	243 340	23.2	836 000	3.4	
Italy	90	3 023 344	319 566	10.6	7 673 484	24.0	
	82	3 270 560	500 940	15.3	8 527 000	17.0	
	70	3 607 262	962 082	26.7	8 696 000	9.0	
Netherlands	90	127 367	66 380	52.1	4 771 641	71.9	
	79	148 674	90 946	61.2	5 148 647	56.6	
	70	184 613	130 842	70.9	4 314 000	33.0	
Norway	89	99 382	37 584	37.8	949 369	25.3	
	79	125 302	53 793	42.9	868 843	16.2	
	71	154 977	82 465	53.2	973 000	11.8	
Poland	90	3 783 000	2 667 015	70.5	10 048 929	3.8	
	70	3 398 959	2 537 978	74.7	8 002 000	3.2	
Portugal	89	598 742	219 550	36.7	1 401 206	6.4	
	79	783 944	268 622	34.3	1 165 151	4.5	
Spain	89	2 284 944	328 130	14.4	4 800 129	14.6	
	82	2 375 327	452 751	19.1	4 552 072	10.1	
Switzerland	90	108 296	66 249	61.2	1 865 727	28.2	
	80	125 274	76 423	61.0	1 932 897	25.3	
	69	152 859	109 352	71.5	1 753 000	16.0	
United Kingdom	93	244 205	136 708	56.0	11 751 000	86.0	
	79	268 560	183 940	68.5	13 539 370	73.6	
	70	326 698	227 558	69.7	12 581 000	55.3	
OECD COUNTRIES OUTSIDE EUROPE							
Australia	90	129 540	75 105	58.0	23 191 000	308.8	
	70/71	249 485	169 931	68.1	24 357 000	143.3	
Canada	91	280 043	145 747	52.0	12 972 038	89.0	
	81	318 361	185 173	58.2	13 501 904	72.9	
	71	366 128	248 757	67.9	13 278 000	53.4	
U.S.A.	87	2 087 759	1 176 346	56.3	95 847 299	81.5	
	78	2 478 642	1 467 944	59.2	105 715 399	72.0	
	69	2 730 250	1 719 403	63.0	106 381 000	61.9	

 $^{^{(1)}}$ Includes only countries for which data for the 1990 census round, and also for the 1980 and/or 1970 census round were available

⁽²⁾ Data for 71 and 79 exclude Germany, Dem. Rep. of.

^[3] Data source: Eurostat - Farm Structure - 1995 Sample Survey.