Single Integrated Metadata Structure (SIMS v2.0)
(user oriented)

Country: Greece

Compiling agency: ELSTAT

Domain name: Livestock Surveys

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1. Contact		Top
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2. Metadata update	
2.1 Metadata last certified	June 2020
2.2 Metadata last posted	June 2020
2.3 Metadata last update	June 2020

3. Statistical presentation

3.1 Data description

The statistical surveys on livestock are carried out every year according to the Council Regulation 1165/2008, in order to provide information on the total number of bovine animals (it should be noted, that, buffalos are included in the results bovine animals survey since 2018), pigs, sheep and goats, as well as on the total domestic production of meat, milk and dairy products, at Regional level (NUTS 2), thus offering a basis for decision-making concerning Common Agricultural Policy.

The livestock surveys conducted, are:
- Annual survey on pig livestock
- Annual survey on bovine livestock
- Annual survey on sheep livestock
- Annual survey on goat livestock

The unit of the survey is the livestock holding with the surveyed animal.
The livestock surveys are sample surveys and the sampling method used is the single stratified random sampling. The livestock holdings with the surveyed animals covered by the survey are stratified as follows:

- ➢ By region - NUTS 2
- ➢ By size class of the holdings.

The surveys are conducted in all EU Member States using harmonized methodology and the characteristics and variables of the surveys are laid down in Community legislation.

3.2 Classification system

The animal species by age and weight are listed in Annex II to Regulation (EU) No1165/2008 of the European Parliament and of the Council concerning the statistics on livestock and meat:

http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02008R1165-20140110&rid=1

The geographical classification is related to NUTS.

3.3 Sector coverage

The surveys are sample surveys and are conducted by:
- animal species by age and weight
- region - NUTS 2·
- size class of the holdings

3.4 Statistical concepts and definitions

For the purposes of the surveys the following definitions shall apply:
- "Agricultural holding" means a single unit, both technically and economically, which has a single management and which undertakes agricultural activities within the economic territory of the European Union, either as its primary or secondary activity

- "Bovine animals": bovine domestic animals of the species Bos Taurus and Bubalus bubalus, including hybrids like Beefalo.
- "Pigs": domestic animals of the species Sus scrofa domesticus.
- "Sheep": domestic animals of the species Ovis aries.
- "Goats": domestic animals of the subspecies Capra aegagrus hircus.
- "Slaughterhouse": an officially registered establishment used for slaughtering and dressing animals, the meat of which is intended for human consumption.

3.5 Statistical unit

The statistical unit of the surveys is the livestock or mixed holding (a unified unit both in terms of technical and economic perspective, which is run by a unified management body and produces agricultural products).

More specifically, the surveyed unit is the livestock hoding that holds the surveyed animal spacies.

3.6 Statistical population

The statistical population of the livestock surveys is all livestock hodings that hold the surveyed animal spacies (target population) and is specified according to the updated Register of Livestock or Mixed Holdings of ELSTAT.

3.7 Reference area

The surveys cover the whole of the country (Greece) and the survey results are published at the level of the Region (NUTS 1), as well as at the total country level.

3.8 Time coverage

Year

3.9 Base period

Annual surveys

4. Unit of measure [Top]

Number of holdings, number of animals.

5. Reference period [Top]

The 1st November of the year when the surveys are conducted.

6. Institutional mandate [Top]

6.1 Legal acts and other agreements

The legal framework concerning the organization and operation of ELSTAT is as follows:

- **Law 3832/2010** (Government Gazette No 38, Issue A): *"Hellenic Statistical System Establishment of the Hellenic Statistical Authority (ELSTAT) as an Independent Authority",* as amended and in force

- **Regulation on the Operation and Administration of the Hellenic Statistical Authority** (ELSTAT), 2012, (Government Gazette No 2390, Issue B, 28-8-2012)

- **Regulation (EC) No 223/2009 of the European Parliament and of the Council**, on the European statistics (Official Journal of the European Union L 87/164).

- **Article 14 of the Law 3470/2006** (Government Gazette No 132, Issue A): *"National Export Council, tax regulations and other provisions".*

- **Article 3, paragraph 1c, of the Law 3448/2006** (Government Gazette No 57, Issue A): *"For the further use of information coming from the public sector and the settlement of matters falling within the responsibility of the Ministry of Interior, Public Administration and Decentralization".*

- **European Statistics Code of Practice**, adopted by the Statistical Programme Committee on 24 February 2005 and promulgated in the Commission Recommendation of 25 May 2005 on the independence, integrity and accountability of the national and Community statistical Authorities, after its revision, which was adopted on 28 September 2011 by the European Statistical System Committee.

- **Presidential Decree 226/2000** (Government Gazette No 195, Issue A): *"Organization of the General Secretariat of the National Statistical Service of Greece".*

- **Articles 4, 12 , 13, 14, 15 and 16 of the Law 2392/1996** (Government Gazette No 60, Issue A): *"Access of the General Secretariat of the National Statistical Service of Greece to administrative sources and administrative files, Statistical Confidentiality Committee, settlement of matters concerning the conduct of censuses and statistical works, as well as of matters of the General Secretariat of the National Statistical Service of Greece".*

The Legal Framework is detailed in the following link:

http://www.statistics.gr/en/legal-framework

European Legislation:

- **Regulation (EU) No 165/2008** of the European Parliament and of the Council concerning the statistics on livestock and meat.

6.2 Data sharing

7. Confidentiality

7.1 Confidentiality - policy

The issues concerning the observance of statistical confidentiality by the Hellenic Statistical Authority

(ELSTAT) are arranged by articles 7, 8 and 9 of the Law 3832/2010 as in force, by Articles 8, 10 and 11(2) of the Regulation on Statistical Obligations of the agencies of the Hellenic Statistical System and by Articles 10 and 15 of the Regulation on the Operation and Administration of ELSTAT.
More precisely:

ELSTAT disseminates the statistics in compliance with the statistical principles of the European Statistics Code of Practice and in particular with the principle of statistical confidentiality.

http://www.statistics.gr/en/statistical-confidentiality?inheritRedirect=true

7.2 Confidentiality - data treatment

> ELSTAT protects and does not disseminate data it has obtained or it has access to, which enable the direct or indirect identification of the statistical units that have provided them by the disclosure of individual information directly received for statistical purposes or indirectly supplied from administrative or other sources. ELSTAT takes all appropriate preventive measures so as to render impossible the identification of individual statistical units by technical or other means that might reasonably be used by a third party. Statistical data that could potentially enable the identification of the statistical unit are disseminated by ELSTAT if and only if:

> a) these data have been treated, as it is specifically set out in the Regulation on Statistical Obligations of the agencies of the Hellenic Statistical System (ELSS), in such a way that their dissemination does not prejudice statistical confidentiality or

> b) the statistical unit has given its consent, without any reservations, for the disclosure of data.

> The confidential data that are transmitted by ELSS agencies to ELSTAT are used exclusively for statistical purposes and the only persons who have the right to have access to these data are the personnel engaged in this task and appointed by an act of the President of ELSTAT.

> ELSTAT may grant researchers conducting statistical analyses for scientific purposes access to data that enable the indirect identification of the statistical units concerned. The access is granted provided the following conditions are satisfied:

> a) an appropriate request together with a detailed research proposal in conformity with current scientific standards have been submitted;

> b) the research proposal indicates in sufficient detail the set of data to be accessed, the methods of analyzing them, and the time needed for the research;

> c) a contract specifying the conditions for access, the obligations of the researchers, the measures for respecting the confidentiality of statistical data and the sanctions in case of breach of these obligations has been signed by the individual researcher, by his/her institution, or by the organization commissioning the research, as the case may be, and by ELSTAT.

> Issues referring to the observance of statistical confidentiality are examined by the Statistical Confidentiality Committee (SCC) operating in ELSTAT. The responsibilities of this Committee are to make recommendations to the President of ELSTAT on:

>> • the level of detail at which statistical data can be disseminated, so as the identification, either directly or indirectly, of the surveyed statistical unit is not possible;

- the anonymization criteria for the microdata provided to users;

- the granting to researchers access to confidential data for scientific purposes.

> The staff of ELSTAT, under any employment status, as well as the temporary survey workers who are employed for the collection of statistical data in statistical surveys conducted by ELSTAT, who acquire access by any means to confidential data, are bound by the principle of confidentiality and must use these data exclusively for the statistical purposes of ELSTAT. After the termination of their term of office, they are not allowed to use these data for any purpose.

> Violation of data confidentiality and/or statistical confidentiality by any civil servant or employee of ELSTAT constitutes the disciplinary offence of violation of duty and may be punished with the penalty of final dismissal.

> ELSTAT, by its decision, may impose a penalty amounting from ten thousand (10,000) up to two hundred thousand (200,000) euros to anyone who violates the confidentiality of data and/or statistical confidentiality. The penalty is always imposed after the hearing of the defense of the person liable for the breach, depending on the gravity and the repercussions of the violation. Any elapse constitutes an aggravating factor for the assessment of the administrative sanction.

8. Release policy

8.1 Release calendar

The livestock surveys data are disseminated as soon as available. .At the end of the year, ELSTAT publishes a release calendar that includes the exact press releases' dates of all statistical work for the next year

8.2 Release calendar access

The release calendar is distributed to the press and is available free of charge to anyone interested. The release calendar is also posted on ELSTAT website:

http://www.statistics.gr/en/calendar

8.3 User access

More information on the results of the survey and the methodology followed can be found on the website of ELSTAT (www.statistics.gr) at the link «Agriculture, Livestock, Fishery» > Livestock/Crops Surveys > Livestock Surveys:

http://www.statistics.gr/en/statistics/-/publication/SPK13/-

as well as on Eurostat website:

http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

9. Frequency of dissemination

The dissemination is on yearly basis.

10. Accessibility and clarity

10.1 News release

Press releases are published on the website of ELSTAT in accordance with the release calendar:
http://www.statistics.gr/en/calendar

10.2 Publications

The surveys results are included in a specific informative publication " Agriculture and Livestock Statistics" pulished in the frame of the Thessaloniki International Fair (TIF).

10.3 On-line database

Tabulated data are available through the website of ELSTAT (See 8.3).

10.3.1 Data tables - consultations

The total access to the Livestock Surveys statistical data on the website of ELSTAT for the year 2019 amounts to 4628 hits.

10.4 Micro-data access

The microdata are available on request to:

http://www.statistics.gr/en/scientific_provision_data

For confidentiality reasons, access to microdata is permitted only under strict conditions and with respect of the relevant process.

10.5 Other

ELSTAT website:
http://www.statistics.gr/en/home

For historical data:
http://dlib.statistics.gr/portal/page/portal/ESYE/

Users can be given data not available on the website, after submitting an application to:
http://www.statistics.gr/en/provision-of-statistical-data

EUROSTAT website:

http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

10.5.1 Metadata – consultations

See 10.3.1

10.6 Documentation on methodology
A reference to the methodology used is available at each time period: http://www.statistics.gr/en/statistics/-/publication/SPK13/- **10.6.1 Metadata completeness – rate**

10.7 Quality documentation

11. Quality management

11.1 Quality assurance
In a first stage, quality assurance is achieved by checking completeness of the questionnaires and subsequently by quality checks for data validation, which are conducted during the whole process of the compilation of the data. Additionally, logical checks are conducted in order to identify and correct any non-sampling errors (coverage or measurement errors or data process errors, etc). Moreover, the coefficients of variation for the estimation of the main variables is calculated, in order to assess the sampling errors.

11.2 Quality assessment
The quality of the survey is satisfactory, since the percentage of sampling errors, expressed as variation coefficients for the basic variables for Greece total, does not exceed 2%. In addition, logical checks are carried out in order to identify and correct any non-sampling errors.

12. Relevance

12.1 User needs
According to ELSTAT's general policy the user needs are expressed in user conferences conducted at regular intervals: http://www.statistics.gr/en/user-conference ELSTAT also records the user needs through the every day communication between the institution and the users. ELSTAT compiles its annual programs as well as the 3-year program of the Hellenic Statistical System setting as a goal the satisfaction of users needs. Main users of agricultural surveys data are: National Accounts Division of ELSTAT, Ministry of Rural Development and Food, Universities, Research centers, European and International Organizations. The data are used for drawing agricultural policy at national level and the Common Agricultural Policy in the framework of the Community organization of markets and agricultural products. In addition, the data cover national needs pertaining to the elaboration of development programs in the agricultural sector, as well as international obligation of Greece.

12.2 User satisfaction
In order to fulfill the need of Greek users, ELSTAT carries out a User Survey. The data from this survey are

posted on the portal of ELSTAT:
http://www.statistics.gr/en/user-satisfaction-survey

12.3 Data completeness

According to the users needs and the Commission Regulation, full completeness exists.

13. Accuracy and reliability

13.1 Overall accuracy

The results of the survey are characterized by high accuracy, since the sampling errors for the main variables are low (falls within the limits) and the non-sampling errors are negligible, fully meeting the requirements of EU Regulations.

13.2 Sampling error

The number of sampling errors, which are expressed by means of coefficients of variation, falls within the limits specified in relevant Regulations. More specifically, for the livestock surveys sampling errors for the results at the level of a Member State do not exceed (confidence interval at 68%):

i. 1% of the total number of bovine animals (5% when the number of bovine animals is less than 1,000,000),

ii. 1,5% of the total number of dairy cows (5% when the number of cows is less than 500,000),

iii. 2% of the total number of pigs (5% when the number of pigs is less than 1,000,000),

iv. 2% of the total number of sheep-goats (5% when the number of sheep-goats is less than 1,000,000).

In the livestock surveys 2018, the sampling errors where as follows:

➢ Bovine animals: 0.47%

➢ Pigs: 0.16%

➢ Sheep: 0.53%

➢ Goats: 0.64%

13.3 Non-sampling error

a. Unit non – response

The non-response rates (%) of the livestock surveys 2017 are presented below:

	Initial Sample Size	Respondents	Non-response rate (%)
Bovine animals	1,334	1,224	8.2
Pigs	1,015	897	11.6
Sheep	2,360	2,183	7.5
Goats	1,807	1,661	8.1

b. Item non - response

Not existing

13.3.1 Coverage error

Coverage errors (or frame errors) are arisen due to existing divergences between the target population and the frame population. The surveys design was based on data from the Agricultural and Livestock holdings register that was compiled based on the agricultural census 2009**.**

Over-coverage

Over-coverage stems from the fact that there are units accessible via the frame but they do not belong to the target population. In the livestock survey, the over-coverage mainly has to do with holdings that were included in the agricultural register, they were selected in the sample, but they did not actually exist at the time of the survey (closed holdings). These holdings actually reduce the initial sample size.

The decrease of the number of sampling units from the initial to the actual size inflates the variance of the parameter's estimate. In this case, the estimator is unbiased under the condition that the death rate of holdings is equal to their birth rate. However, if the exact rate of closed holdings is not known the applied estimator may be biased.

Under-coverage

Under-coverage refers to units missing from the sampling frame. The under-coverage of the frame underestimates the produced statistics. Corrections and weighting for non-coverage is difficult, because the under-coverage rates cannot be obtained from the sample itself, but only from external sources.

13.3.1.1 Over-coverage – rate

13.3.1.2 Common units – proportion

13.3.2 Measurement error

Measurement errors occur during the data collection and make the recorded values of variables to be different than the true ones. Their causes are commonly categorized as:

- Survey instrument: Questionnaire or other measuring instrument used for data collection may lead to recording of wrong values,
- Respondent: Respondents may, consciously or unconsciously, provide erroneous data
- Interviewer: Interviewers may influence the answers given by respondents.

Generally, measurement errors can be regarded as random errors and contributes in the increase of the variance. This extra variance (interview variance) is linked with the data collection process and also has large effect on the accuracy of survey characteristics.
In the livestock surveys, the data collection method used was face-to-face interview completing paper questionnaires. The collection method applied ensured the high quality of the information gathered, since the interviewers assisted the respondents, and carefully checked the filled in questionnaires, before leaving the holding.

The interviewers participated in the survey were private collaborators. Before the initiation of the survey, the interviewers attended a training seminar. The scope of the seminar was to enable the interviewers to: a) fully understand the definitions of the survey characteristics in order to avoid the respondent bias, (b) correctly fill in the questionnaire, and (c) efficiently check for errors by applying logical checks.

The structure and the size of the questionnaire were designed to be user-friendly for the interviewers and the questions were formulated in a clear and simple language, using appropriate vocabulary. Additionally,

documents containing useful instructions were compiled, analyzing all the questions of the questionnaire. This activity aimed at collecting fully filled in questionnaires, with no missing variables.

The support and supervision of the data collection and the data processing were decentralized in the regional offices of ELSTAT. In regional offices the staff was involved in coding, checking for the detection of measurement errors, logical checks and comparisons of the survey data with other sources of statistical information.

After performing all final checks for identifying non-sampling errors, the database was ready for the extrapolation weighting process and the plausibility checks after tabulation. These checks included comparisons of data with relevant data of previous years and of other surveys.

13.3.3 Processing error

Once data have been collected, a range of processes is performed before the production of final estimates (e.g. coding, editing, weighting and tabulating etc.). Errors that arise at these stages are called processing errors. Processing errors can be regarded as random errors, which increase the variance. This extra variance due to processing errors is incorporated to the variance of the parameters' estimates.

13.3.4 Model assumption error

No model is applied.

14. Timeliness and punctuality

14.1 Timeliness

The provisional data are transmitted within 3 months from the reference date of the survey and the final results are transmitted within 6 months from the reference period.

14.2 Punctuality

The data are produced within the deadlines specified in EU Regulation.

15. Coherence and comparability

15.1 Comparability - geographical

The definitions of variables are common throughout EU Member States, thus the survey produces fully comparable results among the EU countries.

15.1.1 Assymetry for mirror flows statistics – coefficient

15.2 Comparability over time

The comparability of results for different years is ensured by means of using the same data collection methods and the same definitions of the survey variables.

15.3 Coherence cross-domain

15.3.1 Coherence – sub annual and annual statistics

The data are longitudinally coherent with other surveys, such as the Survey on the Structure of Agricultural and Livestock Holdings and the Annual Survey on Agriculture-Livestock.

15.3.2 Coherence – National Accounts

Livestock survey data are transmitted and used by National Accounts.

15.4 Coherence - internal

All correlating variables are coherent with each other.

16. Cost and burden Top

The cost of the survey is approximately 50,000 euro. The cost mostly pertains to the remuneration of external survey workers. No financial burden on the owners of the livestock holdings that are surveyed. The questionnaires are designed to keep respondent burden low and to ensure good quality of the information collected. The total length of interviewing is in average 15 minutes for the complete fulfillment of the pigs survey questionnaire, 19 minutes for the bovine animals and sheep surveys questionnaires and 18 minutes for the goats surveys questionnaires.

17. Data revision Top

17.1 Revision policy

The released data have undergone several checks and are not subject to revisions.

The surveys follow the revision policy of ELSTAT:

http://www.statistics.gr/documents/20181/a49dca9a-dacf-4b52-b5df-b156216cb354

17.2 Revision practice

ELSTAT revision policy is followed.

18. Statistical processing Top

18.1 Source data

Pig livestock survey

The pig livestock survey is a sample survey and the sampling method used is the single stratified random sampling. The pig livestock holdings covered by the survey are stratified as follows:

- By region - NUTS 2
- By size class of the holdings. In each geographical region, the holdings are stratified into L = 12 size classes, according to their size, which is determined by the number of pigs, according to the updated register of livestock holdings as follows:

Size Class	Number of pigs
Class 1	1 - 2
Class 2	3 - 9
Class 3	10 - 19
Class 4	20 - 29
Class 5	30 - 49
Class 6	50 - 99
Class 7	100 - 199
Class 8	200 - 399
Class 9	400 - 999
Class 10	1000 - 1999
Class 11	2000 - 4999
Class 12	5000 +

Pig livestock holdings belonging to classes 8 - 12 are surveyed exhaustively.
The sampling fraction for livestock holdings with bovine animals in 2019 survey, is 6.2%.

Bovine animals livestock survey

The bovine animals livestock survey is a sample survey and the sampling method used is the single stratified random sampling. The livestock holdings with bovine animals covered by the survey are stratified as follows:

- By region - NUTS 2
- By size class of the holdings. In each geographical region, the holdings are stratified into L = 11 size classes, according to their size, which is determined by the number of bovine animals, according to the updated register of livestock holdings, as follows:

Size Class	Number of pigs
Class 1	1 - 2
Class 2	3 - 5
Class 3	6 - 9
Class 4	10 - 19
Class 5	20 - 29
Class 6	30 - 49
Class 7	50 - 99
Class 8	100 - 199
Class 9	200 - 299
Class 10	300 - 499
Class 11	500+
Class 12	buffalos

Bovine livestock holdings belonging to classes 10 - 12 are surveyed exhaustively.
The sampling fraction for livestock holdings with bovine animals in 2019 survey, is 9.6 %.

Sheep livestock survey

The sheep livestock survey is a sample survey and the sampling method used is the single stratified random sampling. The sheep livestock holdings covered by the survey are stratified as follows:
- By region - NUTS 2
- By size class of the holdings. In each geographical region, the holdings are stratified into L = 10 size classes, according to their size, which is determined by the number of sheep, according to the updated register of livestock holdings, as follows.

Size Class	Number of pigs
Class 1	1 - 4
Class 2	5 - 9
Class 3	10 - 19
Class 4	20 - 29
Class 5	30 - 49
Class 6	50 - 99
Class 7	100 - 199
Class 8	200 - 499
Class 9	500 - 999
Class 10	1000 +

Sheep livestock holdings belonging to class 10 are surveyed exhaustively.
The sampling fraction for sheep livestock holdings in 2019 survey, is 2.8%.

Goat livestock survey

The goat livestock survey is a sample survey and the sampling method used is the single stratified random sampling. The goat livestock holdings covered by the survey are stratified as follows:
- By region - NUTS 2
- By size class of the holdings. In each geographical region, the holdings are stratified into L = 10 size classes, according to their size, which is determined by the number of goats, according to the updated register of livestock holdings, as follows:

Size Class	Number of pigs
Class 1	1 - 4
Class 2	5 - 9
Class 3	10 - 19
Class 4	20 - 49
Class 5	50 - 99
Class 6	100 - 299
Class 7	300 - 499
Class 8	500 - 699
Class 9	700 - 999
Class 10	1000 +

Goat livestock holdings belonging to class 9 and 10 are surveyed exhaustively.

The sampling fraction for goat livestock holdings in 2019 survey, is 2.8%.

18.2 Frequency of data collection

Annualy

18.3 Data collection

The data are collected by means of personal interviews with the owners of the holdings, which fall within the survey sample, on the basis of a specially designed questionnaire.

The designing of the questionnaire ensures that is satisfies both national and Community needs for statistical information. It covers all variables stipulated in EU Regulations.

The questionnaire was designed taking into account the needs of main users (Eurostat, Ministry of Rural Development and Food) as well as the needs of National Accounts Division of ELSTAT.

Data are collected by well-trained survey workers, thus ensuring correctness and efficiency of data collection.

18.4 Data validation

The data are validated by means of logical checks. During data processing any errors are identified and dully corrected. Special emphasis is placed on the errors that may have major impact on the results. After identifying the errors, they are further checked and cross-checked in cooperation with the owner of the holding in order to confirm that it is an error or it is just about an unusual price. At the same time, data are checked for completeness, accuracy and consistency of the correlating variables. Data processing and validation of data are carried out either during or after data entry.

The data are compared with the data of previous years and if major inconsistencies are identified, further checks are carried out.

18.5 Data compilation

After the conduct of automated checks, completeness and coherence checks and cross-checks, and with the use of appropriate imputation methods, the data of the sample are extrapolated for the total number of holdings.

More specifically, the survey characteristics are estimated as follows:

a. Symbols

If index *i* is the selection order of a livestock holding with pigs, cattle, sheep or goats from the sampling frame in the stratum *h* (stratum=crossing of stratification criteria) and if *y* is one of the survey characteristics, the following can be defined:

y_{hi} : is the value of the survey characteristic *y* of the livestock holding with pigs, cattle, sheep or goats in the order *i and* in the stratum *h* ,

Y_h : the sum of the values of the characteristic *y* of all livestock holdings with pigs, cattle, sheep or goats covered by the survey and belonging to stratum *h* ,

Y : the sum of the values of the characteristic *y* of all livestock holdings with pigs, cattle, sheep or goats covered by the survey. That is:

$$Y = \sum_h Y_{hi}$$

where:

N_h : is the number of all livestock holdings with pigs, cattle, sheep or goats covered by the survey and belonging to stratum h

n_h : is the initial sample size in the stratum h

m_h : is the number of respondent units in the stratum h

r_h : is the response rate for stratum h ($r_h = \dfrac{m_h}{n_h}$)

w_{hi} : the extrapolation factor of the livestock holding with pigs, cattle, sheep or goats of order i belonging to stratum h . That is:

$$w_{hi} = 1 / \text{(Probability of the unit } i \text{ to be selected in stratum } h \text{)} \cdot r_h^{-1} = \frac{N_h}{n_h} \cdot \frac{n_h}{m_h} = \frac{N_h}{m_h}$$

b. Estimation process

The estimation of magnitudes Y_h and Y is based on the following formulas:

$$\widehat{Y}_h = \sum_{i=1}^{m_h} w_{hi} \cdot y_{hi}$$

$$\widehat{Y} = \sum_h \widehat{Y}_h = \sum_h \sum_i w_{hi} \cdot y_{hi}$$

The variance estimation of $\widehat{Y}_h$ and $\widehat{Y}$ is based on the formula:

$$V\left(\widehat{Y}_h\right) = \frac{N_h(N_h - m_h)}{m_h} S_h^2 ,$$

where:

$$S_h^2 = \frac{1}{m_h - 1}\left[\sum_{i=1}^{m_h} y_{hi}^2 - \frac{\left(\sum_{i=1}^{m_h} y_{hi}\right)^2}{m_h}\right], \quad V\left(\widehat{Y}\right) = \sum_h V\left(\widehat{Y}_h\right)$$

The coefficient of variation (%) for total estimation $\widehat{Y}$ is calculated by the formula:

$$CV\left(\widehat{Y}\right) = \frac{\sqrt{V\left(\widehat{Y}\right)}}{\widehat{Y}} * 100$$

18.5.1 Imputation – rate

18.6 Adjustment

18.6.1 Seasonal adjustment

19. Comment