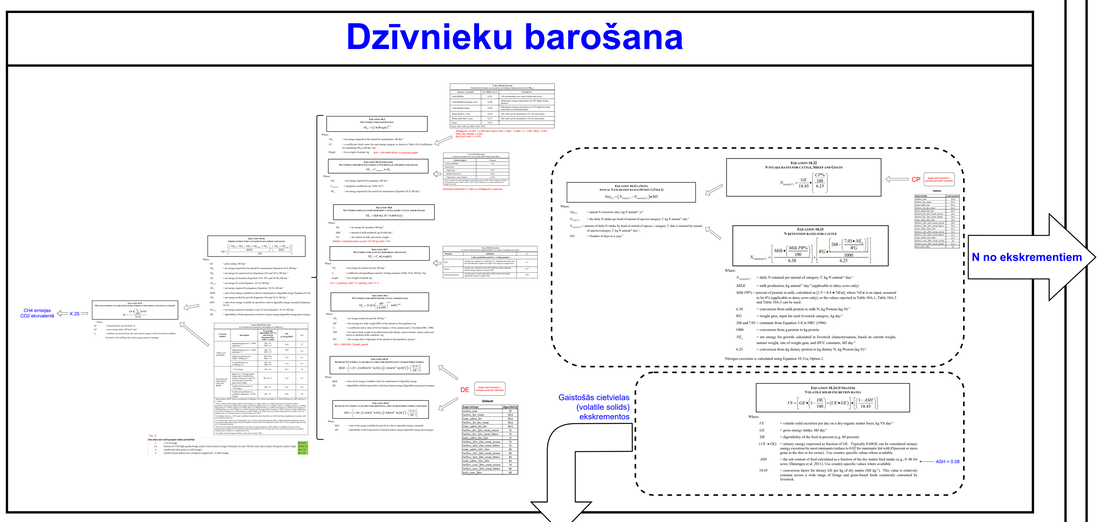
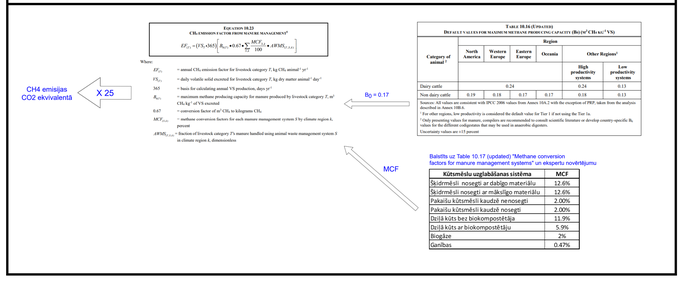
SEG emisiju aprēķina funkcionālais projektējums gaļas liellopu audzēšanas saimniecībām

CH4 emisijas

Dzīvnieku barošana

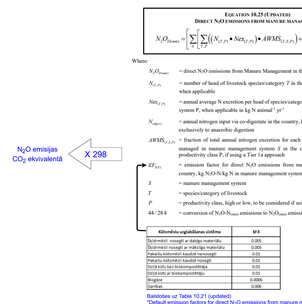


Kūtsmēslu apsaimniekošana



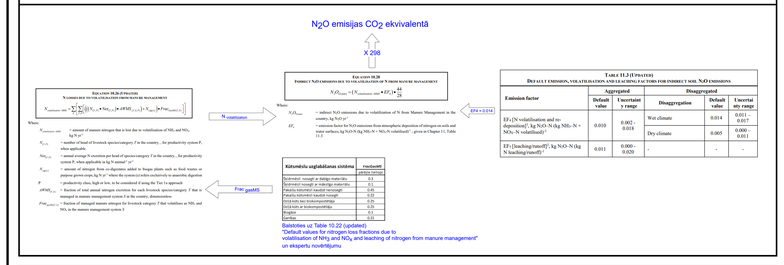
N2O emisijas no kūtsmēslu uzglabāšanas

Tiešās N2O emisijas

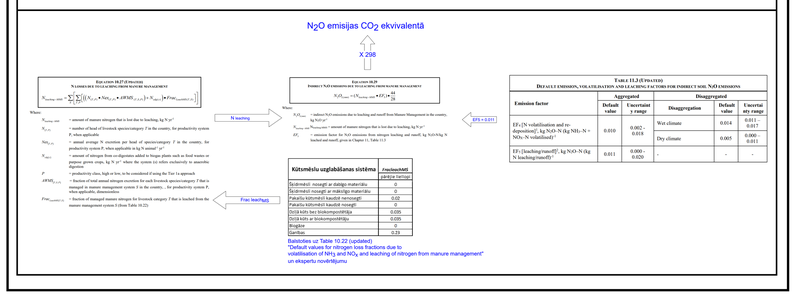


Netiešās N2O emisijas

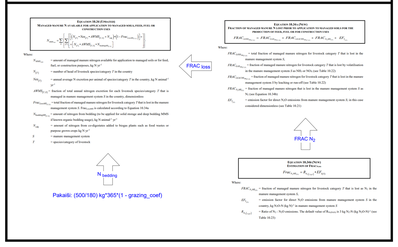
No iztvaikošanas



No izskalošanās



Pieejamais N iestrādei augsnē



N2O no augsnes apsaimniekošanas

Tiešās N2O emisijas

N2O no kūtsmēslu iestrādes augsnē

Equation 11.1 (modified)

DIRECT N2O EMISSIONS FROM MANAGED SOILS

$$N_2O_{direct\ AM} = F_{AM} \cdot EF_1 \cdot \frac{44}{28}$$

Where:

$N_2O_{direct\ AM}$ = annual direct N2O emissions produced from animal manure, kg N2O yr-1

F_{AM} = annual amount of animal manure N applied to soils, kg N yr-1

EF_1 = emission factor for N_2O emissions from N inputs, kg N_2O–N (kg N input)-1 (Table 11.1)

EF1 = 0.006

X 298

N_2O emisijas CO_2 ekvivalentā

Table 11.1 (UPDATED)
DEFAULT EMISSION FACTORS TO ESTIMATE DIRECT N2O EMISSIONS FROM MANAGED SOILS

Emission factor	Aggregated Default value	Aggregated Uncertainty range	Disaggregation[6]	Disaggregated Default value	Disaggregated Uncertainty range
EF_1 for N additions from synthetic fertilisers, organic amendments, crop residues, and N mineralised from mineral soil as a result of loss of soil carbon [kg N2O-N (kg $N)^{-1}$]	0.010	0.001 – 0.018	Synthetic fertiliser inputs[7] in wet climates	0.016	0.013 – 0.019
			Other N inputs[8] in wet climates	0.006	0.001 – 0.011
			All N inputs in dry climates	0.005	0.000 – 0.011
EF_2 for flooded rice fields[1,2] [kg N2O-N (kg $N)^{-1}$]	0.004	0.000 – 0.029	Continuous flooding	0.003	0.000 – 0.010
			Single and multiple drainage	0.005	0.000 – 0.016
$EF_{3PRP,CPP}$ for cattle (dairy, non-dairy and buffalo), poultry and pigs[3] [kg N2O-N (kg $N)^{-1}$]	0.004	0.000– 0.014	Wet climates	0.006	0.000 – 0.026
			Dry climates	0.002	0.000 – 0.006
$EF_{3PRP,SO}$ for sheep and 'other animals'[4] [kg N2O-N (kg $N)^{-1}$]	0.003	0.000 – 0.010	-	-	-

Notes:
[1] Indirect & Bouwman 2006; van Lent et al. 2015; Grace et al. 2016; van der Weerden et al. 2016; Albanito et al. 2017; Cayuela et al. 2017; Liu et al. 2017; Rochette et al. 2018.
[2] Akiyama et al. 2005; Albanito et al. 2017; Cayuela et al. 2017.
[3] Yamulki et al. 1998; Gulbally et al. 2000; Lobrig et al. 2000; Cai & Akiyama 2016; Cardoso et al. 2016; Di et al. 2014; Hoogendoorn et al. 2010; Kasper et al. 2009; Kiese et al. 2011; Li et al. 2006; Li et al. 2010; Lin et al. 2009; Lin et al. 2011; Liu et al. 2011; Lu et al. 2011; Lu et al. 2015; O'Connor et al. 2016; Owen et al. 2016; Pahan et al. 2016; Ward et al. 2016; Behrer et al. 2017; Byrna et al. 2017; Forrestal et al. 2017; Meraiza et al. 2017; Owen et al. 2017; Thomas et al. 2017a, b; Tully et al. 2017; van der Weerden et al. 2017; Cardoso et al. 2018; Chadwick et al. 2018; Nicholas et al. 2018.

Notes:
EF1: Uncertainty range of disaggregated EF, based on the 95% confidence interval of fitted values. Uncertainty range of aggregated EF1 is based on the 2.5th to 97.5th percentile of the dataset (See methods, data and results in Annex 11A.2).
EF2: Uncertainty range is based on the 2.5th to 97.5th percentile (See methods and data in Annex 11A.3).
EF3PRP,CPP and EF3PRP,SO: Uncertainty range is based on the 2.5th to 97.5th percentile (See methods and data in Annex 11A.4)
[5] Table 2.7 in guidance in *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*, Chapter 2, Table 2.7.
[6] Disaggregation of EF1 and EF3PRP,CPP by climate (based on long-term averages): Wet climates occur in temperate and boreal zones where the ratio of annual precipitation: potential evapotranspiration > 1, and tropical zones where annual precipitation > 1000 mm. Dry climates occur in temperate and boreal zones where the ratio of annual precipitation: potential evapotranspiration < 1, and tropical zones where annual precipitation < 1000 mm (Annex 11A.5 for the methods and data for wet and dry climates based on these criteria). In wet climates, the EF is further disaggregated by synthetic fertiliser N inputs and other N inputs.
[7] This emission factor should be used for synthetic fertiliser applications, and fertiliser mixtures that include both synthetic and organic forms of N.
[8] Other N input refers to organic amendments, animal manures (e.g. slurries, digested manures), N in crop residues and mineralised N from soil organic matter decomposition.
[9] Disaggregation of EF3PRP,CPP: Single and multiple drainage also include alternate wetting and drying. Disaggregated EF3PRP,CPP for rice-fed and deep-water systems not provided due to lack of data. The EF1 should be used for upland rice.

N2O no ganīšanas

Equation 11.1 (modified)

DIRECT N2O EMISSIONS FROM MANAGED SOILS

$$N_2O_{direct\ PRP} = F_{PRP,CPP} \cdot EF_{3PRP,CPP} \cdot \frac{44}{28}$$

Where:

$N_2O_{direct\ PRP}$ = annual direct N_2O emissions from urine and dung inputs to grazed soils, kg N_2O yr1

F_{PRP} = annual amount of urine and dung N deposited by grazing animals on pasture, range and paddock, kg N yr-1

(Note: the subscripts CPP and SO refer to Cattle, Poultry and Pigs, and Sheep and Other animals, respectively)

EF_{3PRP} = emission factor for N2O emissions from urine and dung N deposited on pasture, range and paddock by grazing animals, kg N2O–N (kg N input)-1

(Table 11.1) (Note: the subscripts CPP and SO refer to Cattle, Poultry and Pigs, and Sheep and Other animals, respectively)

EF3PRP,CPP = 0.006

X 298

N_2O emisijas CO_2 ekvivalentā

Netiešās N2O emisijas

N_2O emisijas CO_2 ekvivalentā

X 298

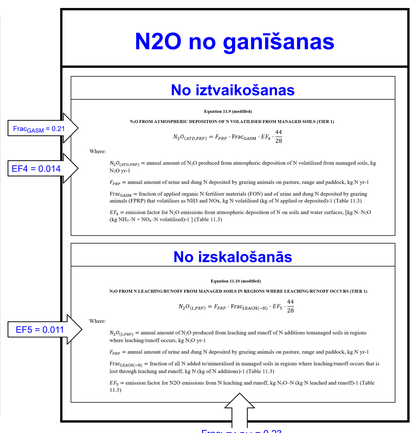
N2O no kūtsmēslu iestrādes augsnē

Table 11.3 (UPDATED)
DEFAULT EMISSION, VOLATILISATION AND LEACHING FACTORS FOR INDIRECT N2O EMISSIONS

Emission factor	Aggregated Default value	Aggregated Uncertainty range	Disaggregation	Disaggregated Default value	Disaggregated Uncertainty range
EF_4 [N volatilisation and re-deposition][1], kg N2O–N (kg NH_3–N + NO_x–N volatilised)[2]	0.010	0.002 – 0.018	Wet climate	0.014	0.011 – 0.017
			Dry climate	0.005	0.000 – 0.011
EF_5 [leaching/runoff][3], kg N2O–N (kg N leaching/runoff)[4]	0.011	0.000 – 0.020	-	-	-
$Frac_{GASF}$ [Volatilisation from synthetic fertiliser][5], (kg NH_3–N + NO_x–N) (kg N applied)[5]	0.11	0.02 – 0.37	Urea	0.15	0.03 – 0.43
			Ammonium-based	0.08	0.02 – 0.30
			Nitrate-based	0.01	0.00 – 0.02
			Ammonium-nitrate-based	0.05	0.00 – 0.20
$Frac_{GASM}$ [Volatilisation from all organic N fertilisers applied, and dung and urine deposited by grazing animals][6], (kg NH_3–N + NO_x–N) (kg N applied or deposited)[7]	0.21	0.00 – 0.31	-	-	-
$Frac_{LEACH-(H)}$ [N losses by leaching/runoff in wet climates][8], kg N (kg N additions or deposition by grazing animals)[7]	0.24	0.01 – 0.73	-	-	-

Sources:
[1] Bouwman et al. 2002; Pan et al. 2016; NS1, Liu et al. 2017.
[2] NS1; Bouwman et al. 2002; Cai & Akiyama 2016; NS3, Liu et al. 2017.
[3] Reviews: Di & Cameron 2002; Cai & Akiyama 2016. Original papers: Moreno et al. 1996; Dinçer et al. 1997; Catt et al. 1998; Sogbedji et al. 2000; Asseik et al. 2002; Rondeau et al. 2002; Ren et al. 2003; Dundas & Qtaishat 2004; Dundas et al. 2004; Dinçer et al. 2004; Bakhsh et al. 2005; Basso & Ritchie 2005; Gelli et al. 2005; Fang et al. 2006; Li et al. 2006; Díez-Lopez et al. 2008; Conrad & Fulmer 2009; Zhu et al. 2009; Chen et al. 2010; Lin et al. 2010; Lin et al. 2011; Liu et al. 2011; Lu et al. 2011; Zhang et al. 2011; Zhang et al. 2012; Huang et al. 2011; Gallejones et al. 2012; Zenga et al. 2012; Sorensen & Rubæk 2012; Tafteh & Sepehzadeh 2012; Wang et al. 2012.
Notes:
Disaggregation by climate for EF_4 and $Frac_{LEACH-(H)}$ (based on long-term averages): Wet climates occur in temperate and boreal zones where the ratio of annual precipitation: potential evapotranspiration > 1, and tropical zones where annual precipitation > 1000 mm. Dry climates occur in temperate and boreal zones where the ratio of annual precipitation: potential evapotranspiration < 1, and tropical zones where annual precipitation < 1000 mm (cf. Annex 11A.5 and Chapter 3 of Vol. 4).
EF_4: The aggregated EF_4 is the same as the aggregated EF. (see Annex 11A.5). The disaggregated EF_4 are the same as the EF_1 disaggregated by wet and dry climates (see Table A2.1 in Annex11A.2). Uncertainty range of the aggregated EF_4 is based on the 2.5th to 97.5th percentile of the dataset, uncertainty range of disaggregated EF_4 is based on the 95% confidence interval of fitted values (See methods and data in Annex 11A.5).
EF_5: This emission factor incorporates three components: $EF_5 = EF_{5r} + EF_{5g} + EF_{5s}$. Emission factor for groundwater and surface drainage, including upstream supersaturated with N2O (N2O emitted mainly from degassing of groundwater). EF_{5r}: Emission factor for rivers and reservoirs, including downstream (supersaturated N2O was already degassed and N2O mainly produced by nitrification/denitrification in situ). EF_{5g}: Emission factor for estuaries. See methods in Annex 11A.6. Uncertainty range is based on the 2.5th to 97.5th percentile.
$Frac_{GASF}$: Calculated by weighting world fertiliser usage with number of observations from review papers (See methods and data in Annex 11A.7). Uncertainty range based on the 2.5th to 97.5th percentile.
$Frac_{GASM}$: See methods in Annex 11A.8. Uncertainty range is based on the 2.5th to 97.5th percentile.
$Frac_{LEACH-(H)}$: The $Frac_{LEACH-(H)}$ applies to wet climates. For dry climate, the default $Frac_{LEACH-(H)}$ is taken as zero. See methods in Annex 11A.9. Uncertainty range is based on the 2.5th to 97.5th percentile.
For Tier 2, country specific $Frac_{LEACH-(H)}$ can be estimated for N losses by leaching/runoff for regions where (Precip) - $\Sigma(ET_c)$ > soil water holding capacity (FC - WP) for a "leaky" soil (Lehner et al. 2019, Table 2, Row 1). ET_c = crop evapotranspiration, FC = field capacity, WP = wilting point evaporation coefficient. Epi pan evaporation is When Kpan is not available, reference evaporation can be estimated as $ET_0 = 0.7$ * Epi (Explanations of reference and pan evaporation: see Allen et al.,1998). Long-term mean of annual rainfall data should be used for estimating $Frac_{LEACH-(H)}$. Precipitation and potential evapotranspiration data are available from global datasets, such as the CRU climate dataset (https://crudata.uea.ac.uk/cru/data/hrg/). If country-specific data are not available.

N2O no ganīšanas



Ieejas dati (input)

Dati par dzīvnieku skaitu
- Zīdītājgovis (suckler_cow)
- Gaļas telītes (0-3 mēn.) (heifers_3m_meat)
- Gaļas bullīši (0-3 mēn.) (male_cattle_3m)
- Gaļas telītes (3-6 mēn.) (heifers_3m_6m_meat)
- Gaļas bullīši (3-6 mēn.) (male_cattle_3m_6m)
- Gaļas telītes (6-12 mēn.) (heifers_6m_12m_meat)
- Gaļas bullīši (6-12 mēn.) (male_cattle_6m_12m)
- Gaļas teles (12-15 mēn.) (heifers_12m_15m_meat)
- Gaļas teļi (12-15 mēn.) (male_cattle_12m_15m)
- Gaļas teles (15-24 mēn.) (heifers_15m_24m_meat)
- Gaļas teļi (15-24 mēn.) (male_cattle_15m_24m)
- Gaļas teles (virs 24 mēn.) (heifers_over_24m_meat)
- Buļļi 24-48 (bulls_24m_48m)
- Buļļi (virs 24 mēn.) (bulls_48m)

Dati par dzīvnieku ganīšanu
- Zīdītājgovis (suckler_cow)
- Gaļas telītes (0-3 mēn.) (heifers_3m_meat)
- Gaļas bullīši (0-3 mēn.) (male_cattle_3m)
- Gaļas telītes (3-6 mēn.) (heifers_3m_6m_meat)
- Gaļas bullīši (3-6 mēn.) (male_cattle_3m_6m)
- Gaļas telītes (6-12 mēn.) (heifers_6m_12m_meat)
- Gaļas bullīši (6-12 mēn.) (male_cattle_6m_12m)
- Gaļas teles (12-15 mēn.) (heifers_12m_15m_meat)
- Gaļas teļi (12-15 mēn.) (male_cattle_12m_15m)
- Gaļas teles (15-24 mēn.) (heifers_15m_24m_meat)
- Gaļas teļi (15-24 mēn.) (male_cattle_15m_24m)
- Gaļas teles (virs 24 mēn.) (heifers_over_24m_meat)
- Buļļi 24-48 (bulls_24m_48m)
- Buļļi (virs 24 mēn.) (bulls_48m)

Ganīšanas veidi
- Bez ganīšanas
- Tradicionālā dienas
- Tradicionālā diennakts
- Pagarinātā dienas
- Pagarinātā diennakts

Dati par kūtsmēslu uzglabāšanu
- Zīdītājgovis (suckler_cow)
- Gaļas telītes (0-3 mēn.) (heifers_3m_meat)
- Gaļas bullīši (0-3 mēn.) (male_cattle_3m)
- Gaļas telītes (3-6 mēn.) (heifers_3m_6m_meat)
- Gaļas bullīši (3-6 mēn.) (male_cattle_3m_6m)
- Gaļas telītes (6-12 mēn.) (heifers_6m_12m_meat)
- Gaļas bullīši (6-12 mēn.) (male_cattle_6m_12m)
- Gaļas teles (12-15 mēn.) (heifers_12m_15m_meat)
- Gaļas teļi (12-15 mēn.) (male_cattle_12m_15m)
- Gaļas teles (15-24 mēn.) (heifers_15m_24m_meat)
- Gaļas teļi (15-24 mēn.) (male_cattle_15m_24m)
- Gaļas teles (virs 24 mēn.) (heifers_over_24m_meat)
- Buļļi 24-48 (bulls_24m_48m)
- Buļļi (virs 24 mēn.) (bulls_48m)

Kūtsmēslu uzglabāšanas veidi
- Šķidrmēsli nosegti ar dabīgo materiālu
- Šķidrmēsli nosegti ar mākslīgo materiālu
- Pakaišu kūtsmēsli kaudzē nenosegti
- Pakaišu kūtmēsli kaudzē nosegti
- Dziļā kūts bez biokompostētāja
- Dziļā kūts ar biokompostētāju
- Bioreaktors

Dati par dzīvnieku barošanu
- Zīdītājgovis (suckler_cow)
- Gaļas telītes (0-3 mēn.) (heifers_3m_meat)
- Gaļas bullīši (0-3 mēn.) (male_cattle_3m)
- Gaļas telītes (3-6 mēn.) (heifers_3m_6m_meat)
- Gaļas bullīši (3-6 mēn.) (male_cattle_3m_6m)
- Gaļas telītes (6-12 mēn.) (heifers_6m_12m_meat)
- Gaļas bullīši (6-12 mēn.) (male_cattle_6m_12m)
- Gaļas teles (12-15 mēn.) (heifers_12m_15m_meat)
- Gaļas teļi (12-15 mēn.) (male_cattle_12m_15m)
- Gaļas teles (15-24 mēn.) (heifers_15m_24m_meat)
- Gaļas teļi (15-24 mēn.) (male_cattle_15m_24m)
- Gaļas teles (virs 24 mēn.) (heifers_over_24m_meat)
- Buļļi 24-48 (bulls_24m_48m)
- Buļļi (virs 24 mēn.) (bulls_48m)

Barības līdzekļu saraksts
- Skābbarība
- Skābsiens
- Siens
- Tritikāle
- ...

Dati par dzīvnieku skaitu
- Zīdītājgovis (suckler_cow)
- Gaļas telītes (0-3 mēn.) (heifers_3m_meat)
- Gaļas bullīši (0-3 mēn.) (male_cattle_3m)
- Gaļas telītes (3-6 mēn.) (heifers_3m_6m_meat)
- Gaļas bullīši (3-6 mēn.) (male_cattle_3m_6m)
- Gaļas telītes (6-12 mēn.) (heifers_6m_12m_meat)
- Gaļas bullīši (6-12 mēn.) (male_cattle_6m_12m)
- Gaļas teles (12-15 mēn.) (heifers_12m_15m_meat)
- Gaļas teļi (12-15 mēn.) (male_cattle_12m_15m)
- Gaļas teles (15-24 mēn.) (heifers_15m_24m_meat)
- Gaļas teļi (15-24 mēn.) (male_cattle_15m_24m)
- Gaļas teles (virs 24 mēn.) (heifers_over_24m_meat)
- Buļļi 24-48 (bulls_24m_48m)
- Buļļi (virs 48 mēn.) (bulls_48m)

Dati par dzīvnieku svaru
- Zīdītājgovis (suckler_cow)

Balstoties uz dzīvnieku kategoriju un vecumu grupu etalonsvariem, proporcionāli tiek aprēķināti **pārējo dzīvnieku grupu svari** pa vecuma grupām (etalonsvari pēc "Gaļas šķirņu liellopu audzēšanas programma" (31 lpp.))

Noklusējuma vērtības (default)

Ganīšana

Gaļas liellopi	Ganību sezona dienas	Ganību sezona h dienā	ziemā kūts	ziemā nojume
suckler_cow	196	24	jā	nē
heifers_3m_meat	196	24	jā	nē
male_cattle_3m	196	24	jā	nē
heifers_3m_6m_meat	196	24	jā	nē
male_cattle_3m_6m	196	24	jā	nē
heifers_6m_12m_meat_renew	196	24	jā	nē
heifers_6m_12m_meat_fatten	196	24	jā	nē
male_cattle_6m_12m	196	24	jā	nē
heifers_12m_15m_meat_renew	196	24	jā	nē
heifers_12m_15m_meat_fatten	196	24	jā	nē
male_cattle_12m_15m	0	0	jā	nē
heifers_15m_24m_meat_renew	196	24	jā	nē
heifers_15m_24m_meat_fatten	196	24	jā	nē
male_cattle_15m_24m	0	0	jā	nē
heifers_over_24m_meat_renew	196	24	jā	nē
heifers_over_24m_meat_fatten	196	24	jā	nē
bulls_over_24m	196	24	jā	nē

Kūtsmēslu uzglabāšana

Gaļas liellopi	deep_bedding_nobiocomp
suckler_cow	jā
heifers_3m_meat	jā
male_cattle_3m	jā
heifers_3m_6m_meat	jā
male_cattle_3m_6m	jā
heifers_6m_12m_meat_renew	jā
heifers_6m_12m_meat_fatten	jā
male_cattle_6m_12m	jā
heifers_12m_15m_meat_renew	jā
heifers_12m_15m_meat_fatten	jā
male_cattle_12m_15m	jā
heifers_15m_24m_meat_renew	jā
heifers_15m_24m_meat_fatten	jā
male_cattle_15m_24m	jā
heifers_over_24m_meat_renew	jā
heifers_over_24m_meat_fatten	jā
bulls_over_24m	jā

Izejas dati (output): Emisijas

Kopā, tonnas CO_2 ekviv.

No zarnu fermentācijas, tonnas CO_2 ekviv.

No kūtsmēslu apsaimniekošanas, tonnas CO_2 ekviv.

No ganīšanas, tonnas CO_2 ekviv.

No kūtsmēslu iestrādes augsnē, tonnas CO_2 ekviv.