

Casee Conference  
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## **Animal Production and Climate Change**

**a scientific discourse on the  
influence of nutrition on environment  
and climate**

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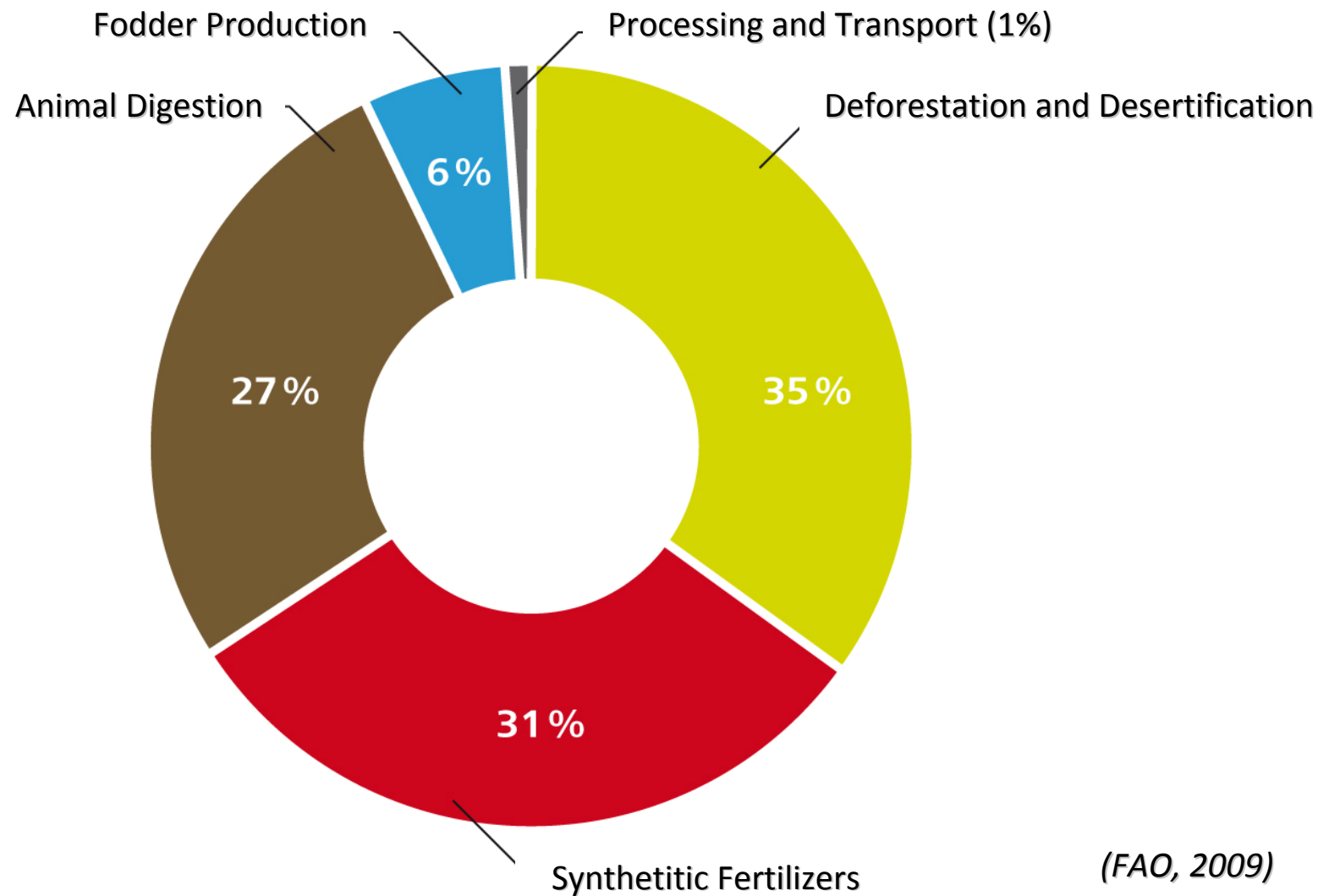
1. Greenhouse Gas Emissions (GHGs) of the animal production sector
2. Prognoses and outlook of future meat production and consumption
3. Modification of nutrition habits and possible synergy effects for humans, climate and environment
4. Conclusio

# Emissions of the Livestock Sector

- Animal production on global scale: **18%** of all GHGs – more than the entire transport sector (*Steinfeld et al., 2006*)
- Alternative calculations: **51%** (*World Watch Institute, 2010*)
- **EU-27: 12,8%**  
(*Joint Research Centre, 2011*)



# Sources within the Livestock Sector



(FAO, 2009)



# Reasons for High Emissions

- Up to 20 times more energy needed for animal products (production of fertilizers and fodder)
- 4,5-25 kg grains for 1 kg meat
- Loss of
  - 89-97% energy
  - 80-96% protein
  - 99% carbohydrates
  - 100% fibres
- 40% of global wheat and 90% of global soy harvest is fed to animals = efficiency gap => potential savings (FAO, 2006)

# Number of Livestock and Animals slaughtered

- Total population: 25 Bio.
  - Slaughtered animals for human consumption: 60 Bio./yr
    - 57 Bio. poultry
    - 2,5 Bio. cattle, pork, sheep, goats, buffaloes
    - 0,5 Bio. camels, snakes etc.
- Sum: **66,4 Bio. animals/yr** (including fish)

*(FAOSTAT, 2010)*

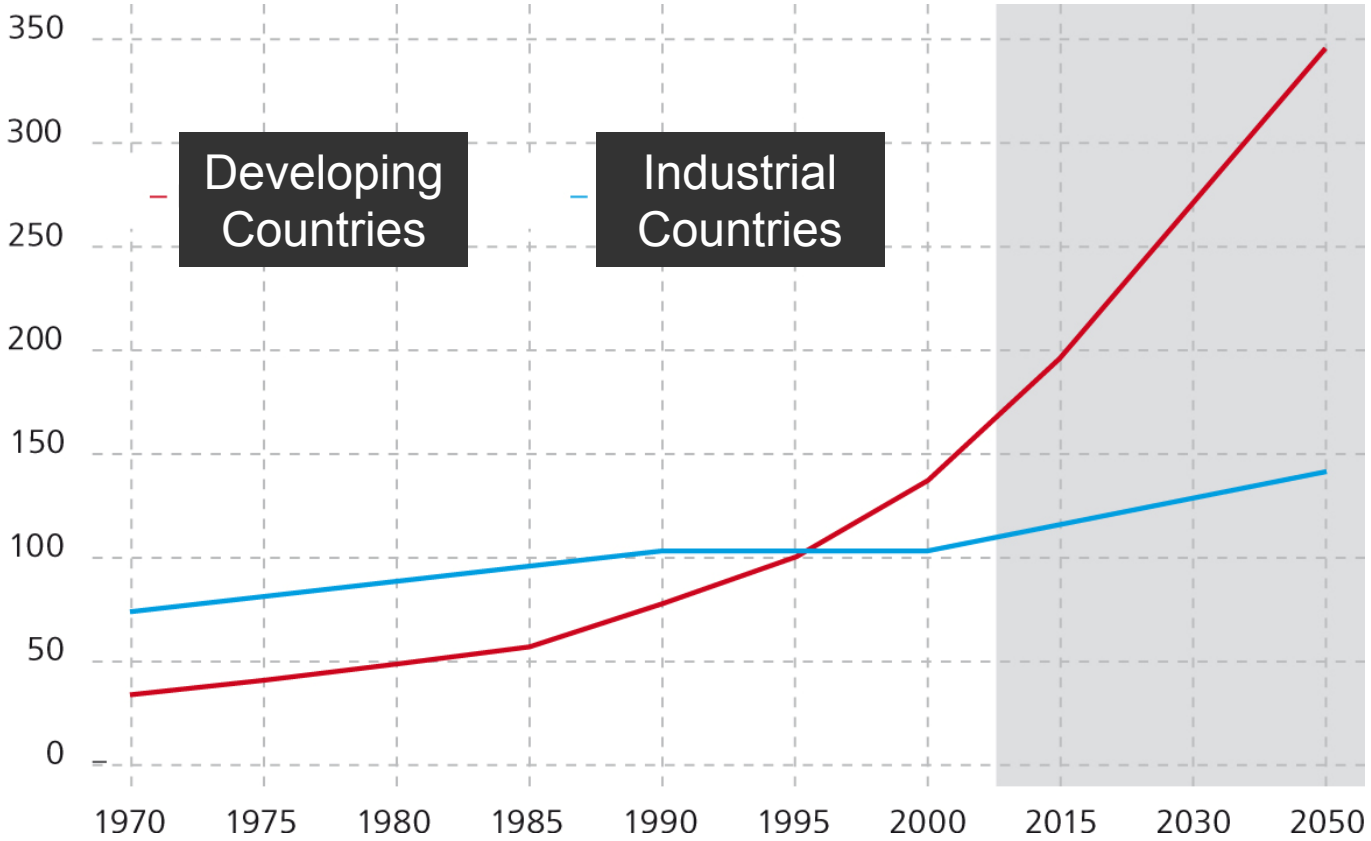
# Meat Consumption on Regional Scale

## Meat Consumption (kg/head/yr)

Region/Land	Meat		Milk		Eggs	
	1980	2005	1980	2005	1980	2005
Industrial Countr.	76,3	82,1	197,6	207,7	14,3	13,0
Developing Countr.	14,1	30,9	33,9	50,5	2,5	8,0
World	30,0	41,2	75,7	82,1	5,5	9,0
China	13,7	59,5	2,3	23,2	2,5	8,0
Brazil	41,0	80,8	85,9	120,8	5,6	6,8
India	3,7	5,1	38,5	65,3	0,7	1,8

(FAO, 2009)

# Animal Production till 2050



2000-2050: Doubling of the amount to 465 Million tons

(FAO, 2006)





# Prognoses and Outlook

- Increase of Methane and Nitrous Oxides (50% till 2020)  
*(US-EPA, 2006; IPCC, 2007)*
  - Environmental Problems, deforestation, zoonotic diseases
  - ↑ agriculture land → ↑ competition for land between sectors  
(direct human consumption, industry, urbanisation, agro fuels)
  - Factors for nutrition security:
    - restriction or limitation of scarce resources (oil, phosphorus, land, water) , extreme events (yield, population growth, ↑ food, nutrition habits, economic crises
- possibly undermine food production

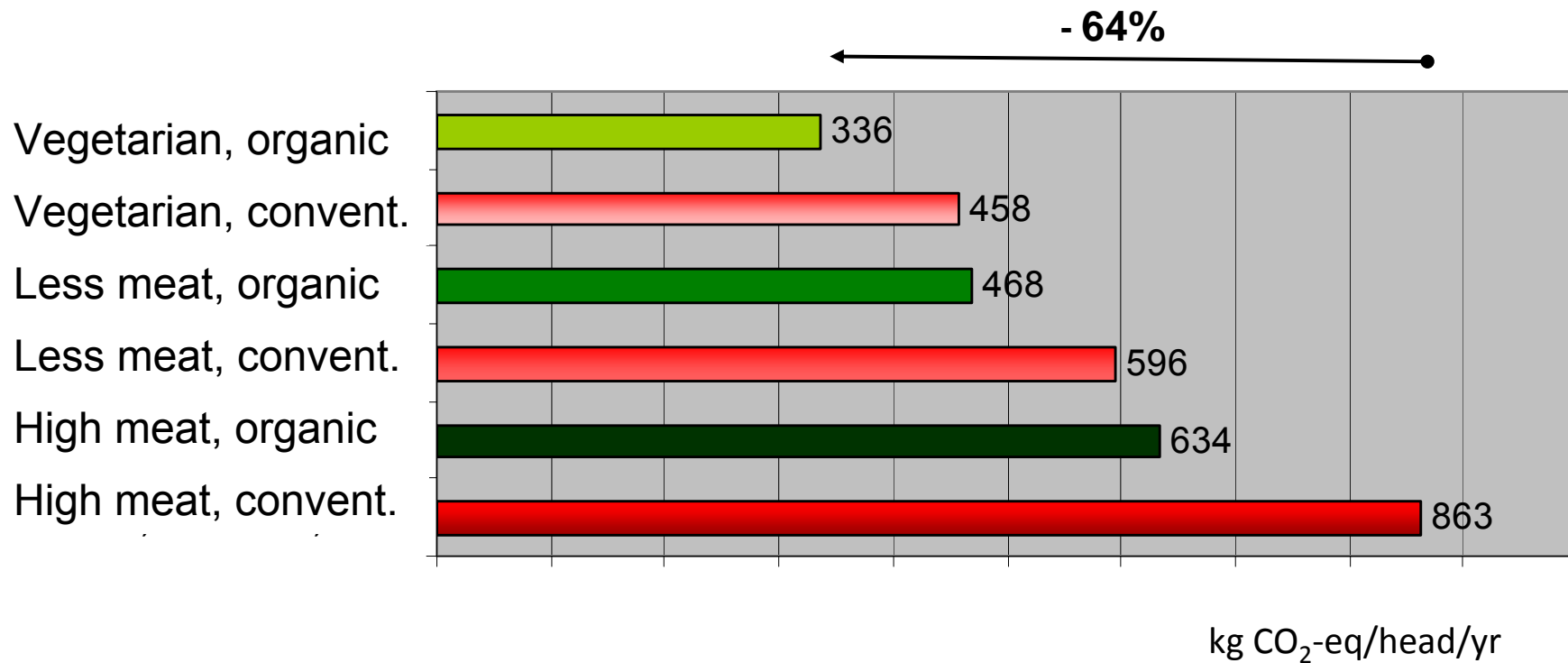
# Product based Greenhouse Gas Emissions

Animal Products		Plant Products	
	CO <sub>2</sub> -equivalents (kg/kg food)		CO <sub>2</sub> -Äquivalente (kg/kg Lebensmittel)
Butter	23.8	Oil	1.9
Beef	13.3 (15-32.2)	Tofu	1.1
Cheese	8.5 (8.8-26)	Baking goods	0.9
Cream	7.6	Durum products	0.9
Poultry	3.5 (4.6-6.4)	Bread	0.8
Pork	3.2 (4.4-6.4)	Fruits	0.5
Eggs C/FR*	1.9/2.6 (5.3-7)	Wheat	0.4
Fish	- (1.3-4.2)	Tomatoes	0.3
Yoghurt	1.2	Potatoes	0.2
Milk	0.9 (0.8-1.4)	Vegetables	0.2

\*) C = Cage; FR = Free Range

(Wiegmann et al., 2005; Fritsche und Eberle, 2007; GEMIS 4,4)

# Nutrition Behaviours and Climate Change Impacts



(Hoffmann, 2002)

# Possible Synergy Effects of a Plant based Nutrition



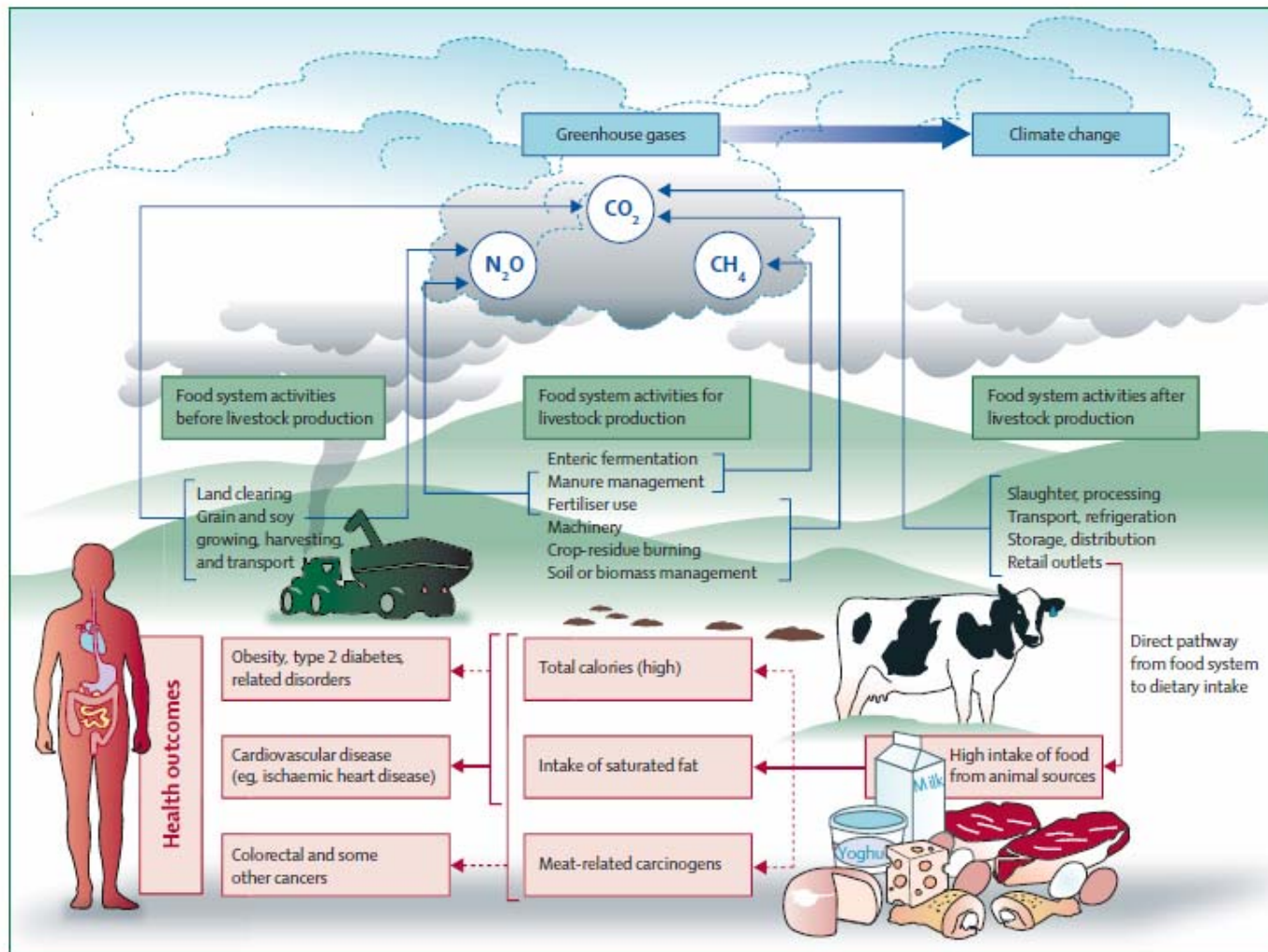
- Less land use
- Safing and maintainance of important water ressources
- Protection of (rain)forests
- Soil protection
- Improvement of air and water conditions
- Maintainance of Biodiversity

# Possible Synergy Effects of a Plant based Nutrition



- Enhancing efficiency leading to benefits for food resources
- Improvement of food security and resilience
- Reduction of fodder imports from developing countries
- Economic benefits
- Improved animal welfare
- Positive health outcomes

# Connecting Nutrition, Environment and Health



- Reduction of animal production of 30%
- 18.000 less death due to the consequences of heart diseases per year

(Friel et al., 2009)

# Conclusio

- Advantages of plant based nutrition regarding resources
- Possible tremendous efficiency gains due to vegetarian nutrition
- Organic, seasonal and regional products enhance positive effect  
*(Leitzmann, 2005)*
- Fair trade products





„Tierproduktion und Klimawandel – ein wissenschaftlicher Diskurs zum Einfluss der Ernährung auf Umwelt und Klima“  
foreword by Claus Leitzmann,  
2. edt., LIT Pub. Vienna/Berlin/Münster, 2011.

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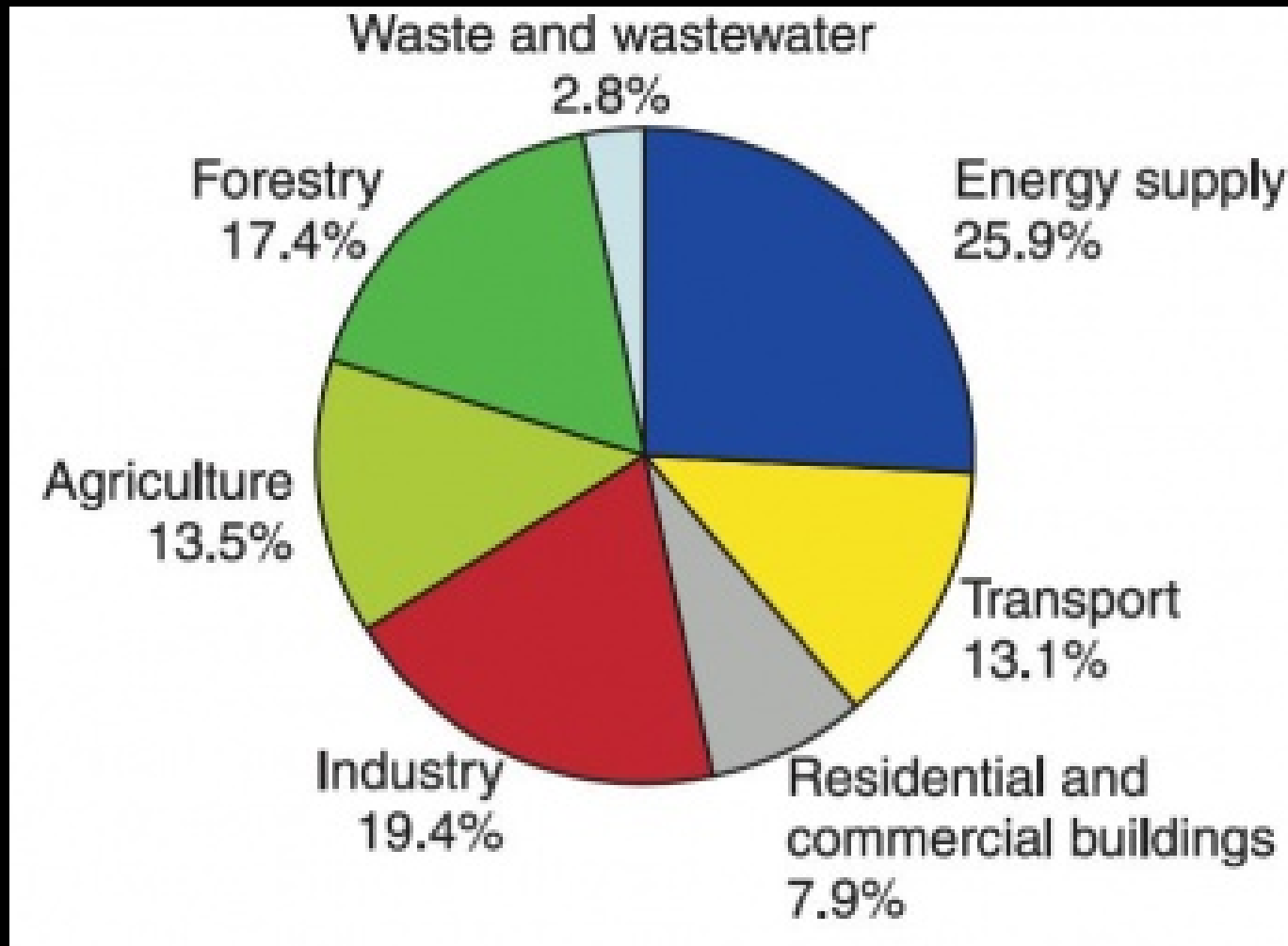


## 5. Prognosen und Ausblick

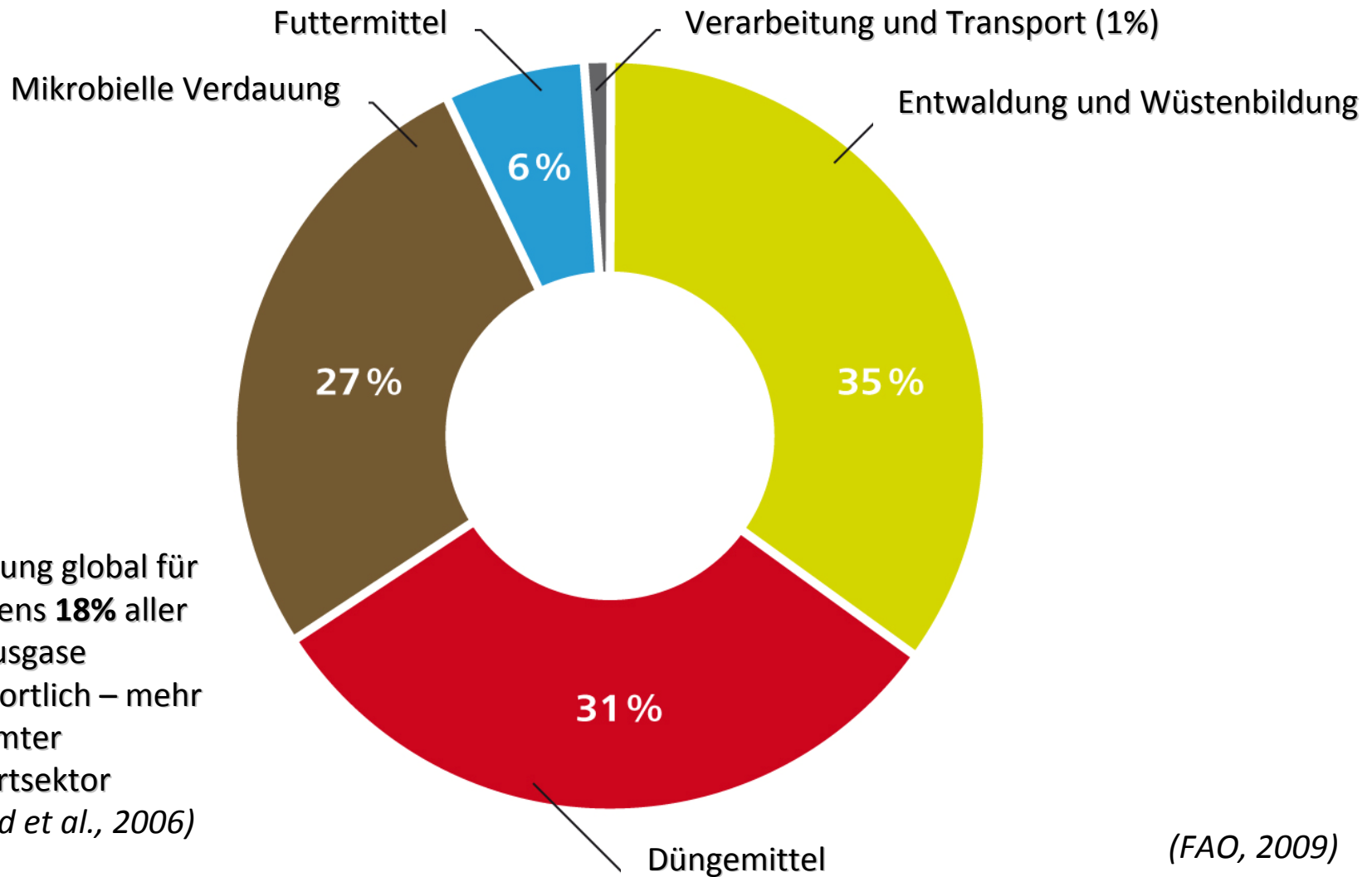
- Gesamtpopulation: 25 Mrd. Tiere
- Schlachtung von 60 Mrd. Tiere für menschlichen Konsum
  - davon 57 Mrd. Geflügeltiere
  - 2,5 Mrd. Rinder, Schweine, Schafe, Ziegen, Büffel
- 66,4 Mrd. inklusive Fisch
- 2000: Getreideverbrauch: 309kg
- Direkte Getreidekonsum: 165kg
- 2030: 339
- Direkter Getreidekonsum: 165kg/Person/Jahr
  
- Erhöhung der Getreideproduktion um die Hälfte (2000: 2 Mrd. t; 2050: 3 Mrd. t)
- Angespannten Land+Wasserressourcen +limitierter Ertragssteigerung : n. als gesichert

## 5. Prognosen und Ausblick

- 1997-2050: Verdoppelung der globalen Getreideproduktion
- Fleischproduktion: +90%
- Entwicklungsländer für 93% des globalen Getreidebedarfszuwachses und 85% des Fleischbedarfszuwachses
- (Entwicklungsländer: Halb so viel Fl. und ein Drittel der Milch)
- 44 vs. 103 kg Fleisch und 78kg/P/a vs. 227 kg/P/a Milch
- Br: derzeit 79; IL: 80,8
- Indien: 1,1 Mrd., China: 1,3 Mrd. (sind 35% der WB!)
- Laut FAO (2002) trotz Intensivierungsmassnahmen: +13% Flächenzuwachs nötig, muss sich simultan der Ressourceneinsatz erhöhen
- 80% der globalen Fischbestände entweder moderat bis stark überfischt oder komplett erschöpft
- S.63; 13% auf ext., 5% auf intensiv
- S.65!größere Produktion v. NWK->mehr CO2 (FM-Prod (düngerherstell., transport v. FM steigt+Rodung von Wäldern, um Fl.bedarf zu stillen
- 40% der Weltgetreideernte verfüttert, doch lediglich 13% der Gesamtkalorien aus tier. Produkten, immenses Einsparpotential!!!!!!



# Treibhausgase im Tierproduktionssektor



Viehhaltung global für mindestens **18%** aller Treibhausgase verantwortlich – mehr als gesamter Transportsektor (Steinfeld et al., 2006)

(FAO, 2009)

# Prognosen und Ausblick

- ↑ Wiederkäuer nicht möglich
  - ↑ Schweine, Hühner → ↑ Intensivierung →  
↑ externer Input an Ressourcen
- ↑ Umweltprobleme (Stickstoff und Phosphor;  
Geruch; zoonotische Erkrankungen; Tierhaltung)
- Entwaldung (CO<sub>2</sub>) für Futtermittel
- Stickstoffdünger (N<sub>2</sub>O)
  - Impact auf Artenvielfalt, Ökosysteme