

SINGLE-IMPACT FICHE

MANURE PROCESSING TECHNIQUES

IMPACT: NUTRIENT LEACHING AND RUN-OFF

Data extracted in July 2021

Note to the reader: This fiche summarises the impact of manure processing techniques on NUTRIENT LEACHING AND RUN-OFF. It is based on 2 peer-reviewed synthesis research papers¹, including from 76 to 114 individual studies.

1. WEIGHT OF THE EVIDENCE

- **CONSISTENCY OF THE IMPACT:**

Manure processing techniques, namely improved techniques for manure composting, have different effects on Nutrient leaching and run-off, depending on the considered composting techniques (see **Table 1**). The number of synthesis papers reporting positive, negative or no effect is based on the statistical comparison of the intervention and the control. The number of synthesis papers reporting relevant results, but without statistical test of the effects is labelled as "uncertain".

According to 1 synthesis paper, periodical turning of manure composting piles and the addition of bulking agents were found to have no significant effect on nutrients loss, compared to conventional solid manure storage, while forced aeration resulted in a negative effect (i.e. increased nutrients loss).

In the other synthesis paper, optimized aeration rate, compost turning frequency, and C/N ratio regulation showed a positive effect on nutrients loss, compared to absence of mitigation technique.

The 2 reviewed synthesis papers include data collected in Europe (see **Table 2**).

Table 1. Summary of effects. The numbers between parenthesis indicate the number of synthesis papers with a quality score of at least 50%. Details on quality criteria can be found in the next section.

Impact	Metric	Intervention (Technique)	Positive	Negative	No effect	Uncertain*
Decrease Nutrient leaching and run-off	Total nitrogen loss	Composting	1 (1)	1 (1)	1 (1)	0

* Number of synthesis papers that report relevant results but without statistical test comparison of the intervention and the control.

- **QUALITY OF THE SYNTHESIS PAPERS:** *The quality score summarises 16 criteria assessing the quality of three main aspects of the synthesis papers: 1) the literature search strategy and studies selection; 2) the statistical analysis; 3) the potential bias. Details on quality criteria can be found in the methodology section of this WIKI.*

2. IMPACTS

The main characteristics and results of the synthesis papers are summarized in **Table 2**. Summaries of the meta-analyses provide fuller information about the results reported in each synthesis paper, in particular about the modulation of effects by factors related to soil, climate and management practices.

¹ Research synthesis papers include a formal meta-analysis or systematic reviews with some quantitative results. Details can be found in the methodology section of the WIKI.

Table 2. Main characteristics of the synthesis papers reporting impacts of manure processing techniques on Nutrient leaching and run-off.

Reference	Population	Scale	Num. papers	Intervention (technique)	Comparator	Metric	Conclusion	Quality score
Zhao, SX; Schmidt, S; Qin, W; Li, J; Li, GX; Zhang, WF 2020	Soild manure and organic waste	Global	114	Mitigation strategies in solid manure composting, i.e. C/N ratio regulation (C/N RR), optimized aeration rate or turning frequency (OAT).	No mitigation technique	Total nitrogen loss	The reduction of total nitrogen losses across all technologies for composting optimization was statistically significant, and averaged C/N regulation 27.9%, optimized aeration 26.9%.	69%
Pardo, G; Moral, R; Aguilera, E; del Prado, A 2015	Solid manure (dairy cows, swine, poultry, green waste)	Global	76	Solid manure storage/treatment techniques (turning, forced aeration, compaction, covering, bulking agents, additives)	Solid manure conventional storage (heaps)	Total nitrogen losses	The incorporation of a bulking agent do not increase substantially nitrogen losses. Forced aeration showed significant losses in total nitrogen, while no significant effect was associated with turning.	69%

3. KNOWLEDGE GAPS

The authors did not report knowledge gaps in the reviewed synthesis papers.