Particulate and dissolved nitrogen (N) waste components are removed in recirculating aquaculture systems (RAS) using different cleaning technologies, and to dimension and optimize their removal efficiency requires that the expected daily load of the different waste forms can be estimated. Using a laboratory, mass-balance approach, the current study examined the effects of commercially applied feeding levels on the loading of different N waste forms, including daily fluctuations in dissolved total nitrogen (TN), total ammonia nitrogen (TAN), urea-N, and non-characterized, dissolved N deriving from juvenile rainbow trout (Oncorhynchus mykiss). In addition, the study examined whether there was a removal of urea-N across a moving bed biofilter operated as end-of-pipe under commercial conditions. The laboratory, mass-balance study showed that there were no effects of feeding levels (1.3, 1.5 or 1.7% of the biomass per day) on the excretion of dissolved N components, which constituted the majority of total N waste (>81.6% on average). The excretion of urea-N and non-characterized, dissolved N components constituted 12–13% and 9–11%, respectively of dissolved TN. The excretion of urea-N was largely constant and independent of the daily feeding practice, whereas that of non-characterized N appeared to reflect the daily feeding activity, following the trends in TN and TAN. The time limited feeding regime applied in the laboratory study resulted in a pulse in the excretion of TAN that a biofilter may be unable to fully level out, potentially resulting in unnoticed, critical water quality conditions in intensive RAS during certain times of the day. Particulate N waste constituted a minor fraction of total N waste (<18.4% on average), and the actual loading depended on the digestibility of dietary protein/nitrogen. Results from the commercially operated, nitrifying biofilter showed that urea-N was removed at a rate of 0.014 g N m⁻² day⁻¹. Compared to the removal of TAN (0.208 g N m⁻² day⁻¹), the moving bed biofilter was 1.07 times more active in removing dissolved N than immediately expected when only considering TAN.

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