Bağırsak Florasının Modülasyonu ve Hayvansal Gıda Ürünlerinde Uygulanması

Zajeba Tabashsum, Vinod Nagarajan, and Debabrata Biswas

1. Giriş

Bağırsak mikrobiyotası, hayvan sağlığını etkileyen en önemli faktörlerden biri haline gelmiştir. Dengeli bağırsak mikrobiyotası enfeksiyona karşı direnci arttırır. Öte yandan, bağırsak mikrobiyotası bozulduğunda dirençteki azalma fark edilir; bu nedenle bağırsak mikrobiyotasının dengelenmesi konak sağlığı için önemlidir (Belkaid ve Hand 2014). Dengeli ve bozulmuş bağırsak popülasyonlarının kompozisyonları net olmasa da, Lactobacilli ve Bifidobacteria türleri strese duyarlı görünmektedir ve bu popülasyonlar bir hayvan stres altındayken azalma eğilimindedir (Conlon ve Bird 2014).

Bitki yan ürünleri, prebiyotikler ve/veya probiyotikler ve hayvan kaynaklı ürünler de dahil olmak üzere biyoaktif bileşikler; diğer faydalı özelliklerinin yanı sıra anti-inflamatuar, antimikrobiyal, antikanserojenik, antioksidan ve vazodilatör özellikleri ile sağlığın iyileştirilmesinde rol oynar (Boivin ve ark. 2007; Tzounis ve diğerleri 2011; Salaheen ve diğerleri 2014a, 2015, 2017). Bu fayda verici aktivitelerin mekanizmaları henüz açıklığa kavuşturulmamıştır, ancak olasılıklardan biri bağırsak/bağırsak mikrobiyotasının modülasyonudur (Hernández ve ark. 2004). Yine, gözlemsel ve epidemiyolojik çalışmalar, konvansiyonel hayvanların çekumlarının mikrobiyal topluluklarında organik benzerlerine göre farklılıklar olduğunu göstermiştir (Torok ve ark. 2011; Mancabelli ve ark. 2016). Antibiyotik büyüme arttırıcıların (AGP) mikropsuz hayvanlar üzerindeki nötr etkileri, hayvanlarda büyümenin desteklenmesinde AGP'ye bağlı bağırsak mikrobiyota modülasyonunun önemini göstermiştir (Turnbaugh ve ark. 2006). İki baskın bakteri filumunun, Bacteroidetes ve Firmicutes›in kilo alımı ile ilişkisi, daha sonraki diğer çalışmalarla desteklenmiştir (Mancabelli ve diğerleri 2016; Singh ve diğerleri. 2013). Diğer bir çalışmada, AGP ile beslenen tavukların bağırsağında *Lactobacillus* türleri, Clostridiales ve Enterobacteriaceae bolluğunun arttığı görülmüştür (Gong ve ark. 2008). Ayrıca *Firmicutes/Bacteroidetes* (F/B) oranı, çiftlik hayvanlarının kilo alımı ve çeşitli ürünlerin terapötik rolü arasında bir ilişki olduğu bildirilmiştir (Singh ve ark. 2013).

Fruktooligosakarit (FOS) ürünleri (oligofruktoz ve inülin), transgalaktooligosakkaritler, glukoligosakkaritler, glikooligosakkaritler, laktuloz, laktitol, maltooligosakka-

ve/veya probiyotiklerin hayvan beslenmesinde destek olarak kullanılması, hayvan sağlığı ve performansını iyileştirmede bağırsak mikrobiyotasını modüle etmek için umut verici bir yaklaşım olabilir, çünkü takviyeler ayrıca yararlı bakteri türlerinin büyümesini teşvik ederek ve spesifik patojenik bakteri suşlarını azaltarak bizi daha güvenli gıda ürünlerine yönlendirebilir. Doğal bitki yan ürünlerinin, prebiyotiklerin ve/veya probiyotiklerin hayvan beslenmesinde takviye olarak kullanılması, hayvan sağlığını ve performansını iyileştirmek için bağırsak mikrobiyotasını modüle etmekte umut verici bir yaklaşım olabilir. Takviyeler ayrıca yararlı bakteri türlerinin büyümesini teşvik ederek ve spesifik patojenik bakteri türlerini azaltarak bizi daha güvenli gıda ürünlerine yönlendirebilir. Çeşitli çalışmalar, bu ürünlerin hayvan yemine eklenmesinin sadece büyümeyi artırmakla kalmayıp aynı zamanda et kalitesini de büyük ölçüde iyileştirdiğini göstermiştir. Bu nedenle, artık bağırsak florasının gıda hayvanlarının büyümesi ve genel kalitesi üzerindeki etkisini belirlemek için laboratuvar/alan denemelerini teşvik etmek gerekmektedir. Ayrıca, bağırsak mikrobiyal popülasyonunu modüle etmede bağırsak mikrobiyotası ve çeşitli yem takviyeleri arasındaki etkileşimleri daha iyi anlamak için gelecekteki deneyler metagenomik, transkriptomik ve proteomik yaklaşımlara odaklanmalıdır. Yakın gelecekte, daha fazla araştırma, yem takviyelerinin bağırsak bakteri popülasyonlarını nasıl modüle ettiğini ve besi hayvanları üretimi ve güvenliğinde nasıl daha etkili olabileceklerini açıklayacaktır.

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