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Effective Dose of Dexmedetomidine with Nalbuphine Hydrochloride or Butorphanol Tartrate for Sedation in Buff Orpington Hens (*Gallus gallus domesticus*)

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Abstract: Chickens (*Gallus gallus domesticus*) are commonly used for research, food production, show, and companionship. Sedation is often necessary for sample collection, imaging, or treatment. Dexmedetomidine has been previously used to sedate birds, often with other sedatives. Butorphanol tartrate, a Schedule IV controlled substance, is commonly used but presents regulatory challenges. Nalbuphine hydrochloride, an opioid with similar receptor affinity to butorphanol, has potential as a noncontrolled alternative. Although information regarding nalbuphine use in birds is limited, its noncontrolled status makes it more accessible. The purpose of this study was to determine the effective dose to produce sedation in 50% (ED_{50}) of patients and to estimate the calculated effective dose of dexmedetomidine in combination with either butorphanol (DexBut) or nalbuphine (DexNal) in domestic hens to sedate 99% of patients (ED_{99}). Eighteen 33-week-old laying Buff Orpington hens were divided into 2 groups: one receiving DexBut (n = 9) and the second receiving DexNal (n = 9). Each hen was sedated with varying doses of intramuscular dexmedetomidine with a constant dose of either 2 mg/kg IM butorphanol or 12.5 mg/kg IM nalbuphine by an up-and-down design. Sedation was determined using a clinically applicable scoring system. The ED_{50} values of dexmedetomidine with 2 mg/kg IM of butorphanol, calculated by both the up-and-down method and logistic regression, were 38 and 49 µg/kg, respectively, while the ED_{50} values of dexmedetomidine in combination with 12.5 mg/kg IM of nalbuphine were 19 and 18 µg/kg, respectively. The estimated dexmedetomidine ED_{99} values with butorphanol or nalbuphine were 51 and 19 µg/kg, respectively. Multiple chickens in both groups exhibited open-mouth breathing and comb pallor but no lasting morbidity or mortality occurred. Combinations of DexBut or DexNal should be considered for sedation of domestic chickens.